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THE GEORGE ADLINGTON SYME ORATION.

ON HOSPITAL PROBLEMS AND SURGICAL EDUCATION.

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IT is traditional to preface such an address as this with a disarming statement as to the speaker's unworthiness. I conform to this custom in all humility and truth, but I am proud to respond to the distinguished compliment the Council has paid the New Zealand Section of the College in allotting it the honour of the second Syme Oration.

We can claim, I believe, that in no other profession is a judicial hero worship better observed than in our own. The great memorial orations, as they exist, and have existed in Great Britain and the Continent for many years, and latterly in America, bear witness to this universal desire in the profession of medicine to honour our great men and to keep their memories green. Syme, as measured by the standards of surgical achievement, precept, example, altruistic and unswerving devotion to duty in its broadest sense, and endowed as he was with those qualities of mind and heart which we call character, may be regarded as a man who stood above his fellows and well worthy of a place in this surgical galaxy.

We, Fellows of the Royal Australasian College of Surgeons, meet tonight to honour the memory of our first President, and to halt for a moment in our journey along the arduous path of practical surgery to draw counsel and fresh stimulus from a review of his professional activities and of his traits of character. Syme is still so near us to be at present a living memory, but as time passes his name as commemorated in this annual fashion will become a symbol in the spirit of its first President for the aims and ideals of this, the youngest of the Colleges of Surgeons. Such must be a source of pride to his family and a call to high endeavour to his son who is one of us.

It is, I think, both fitting and fortunate that thus early in the life of our College we should have been endowed with a memorial oration

and that through the generosity of the family of the man we are assembled to honour. It brings us into line with the older colleges and allows opportunity for reflection on matters practical and matters of the spirit, and without doubt to deliver a memorial address is an onerous privilege. In its highest form, as cut and polished by the hands of Lord Moynihan, President of our elder sister College, it may come to be a gem of many facets, a vivid portrayal of his subject and an eloquent exposition of the spirit of surgery clothed in beautiful and arresting English.

I am heartened in my task, however, by the reflection that a surgical audience must be sympathetic in virtue of our calling and that the subject of this oration himself was a man not given to easy speech. Rather was he of those "who have not the Infirmity but the Virtue of Taciturnity and speak not out of the abundance but the well-weighed thoughts of their hearts".

I cannot paint you a picture of Syme from personal knowledge, for I met him on only one occasion, at the Dunedin Congress in 1927, but his professional utterances then as I heard them, weighty and carefully considered, would seem to have been characteristic of the man. One derived the impression of a stern, grave, inflexible and perhaps rather reserved character, though no doubt this impression was coloured to some extent by his preoccupation with the responsibilities connected with the launching of the College. Let me present to you another picture of this man on his way to a former congress in Dunedin thirty-one years before. Dr. W. S. Roberts, one time Lecturer in Pathology in the Otago Medical School, who conducted the Australian party including Syme overland from Milford Sound, writes:

> The trip was an exceptionally wet one, the Clinton Valley being flooded, and for one day quite impassable. The party, in attempting to proceed, were at one time wading up to their pelves in water, and all had to abandon the attempt for the day. George Syme faced these damp conditions with philosophic calm.

The young man of thirty-seven was father to the man of sixty-seven in that philosophic imperturbability which is so valuable an asset in surgery and played an equally valuable part in solving those initial obstructions attending the birth of the new College.

So far as I can learn, the high estimation in which he was held by his colleagues in purely professional matters lay in his soundness and sanity of outlook. He was essentially a safe surgeon, and the wide and beneficent influence he exercised over students and colleagues was rooted in force of example. It is interesting to recall that another Syme, James Syme, Professor of Clinical Surgery in Edinburgh, and Lister's father-in-law, was accounted the safest surgeon of his day; and to my mind there can be no greater gratification for a surgeon than to achieve at the estimate of his fellows the honourable epithet of "safe". The precept and example of the truly safe surgeon are more powerful influences for good work in the community than are generally recognized; and there can be no doubt that the influence which Syme wielded in silent and unobtrusive fashion, played a valuable part in moulding

surgical thought in his School and State. If we can sponsor a race of "safe" surgeons, our College will have gone far in discharging its main obligation to the community, though it has other obligations to which I shall presently refer.

Syme was deeply interested in medical politics in the best sense, and his feeling of loyalty and responsibility to the British Medical Association, his desire to further its interests and, what necessarily follows, though it is not necessarily accepted, to further its capacity for service to the public, led him in the first place to look askance at the idea of a College of Surgeons as mooted by Sir Louis Barnett in 1920. A man of his age might well be excused had he adopted an attitude of *laissez-faire*, but Syme was no man to follow the easy path of set convictions. Long reflection and fresh impressions acting upon a still elastic mind, convinced him of the necessity for the formation of a guild or association of surgeons embracing Australia and New Zealand, and through his efforts and the devoted cooperation of similarly minded men in both Dominions, has evolved the College. To my mind, there can be no greater tribute to Syme's profound sense of duty and feeling of responsibility to the profession which he had so long adorned, than for a man approaching the allotted span to throw himself heart and soul into this new undertaking and to prosecute its development to the limit of his powers, and this in the last years of his life, when he might have chosen ease and freedom from responsibility.

Few can doubt that this new institution, if wisely directed, is an instrument fraught with great possibilities for the betterment of surgery and likely to be an enduring memorial to the courage and persistence of its founders.

Such then was the man who was chosen in the essential rightness of things to be our first President. He was no Lister, nor can we claim for him any memorable addition to the knowledge of our craft: he was a man more nearly akin to ourselves, or what we would wish to be, and therefore nearer to our hearts. Those of you familiar with the "*Horæ Subsecivæ*" of Dr. John Brown will remember that he who had been James Syme's apprentice and whose apprentice fee bought Syme his first carriage, epitomized his great master in a dedication of six words: *verax, capax, sagax, perspicax, efficax, tenax.* This characterization might well apply to our Syme, and happy is the surgeon who merits at the hands of his pupils such a dedication or epitaph.

Let me now recapitulate the aims of the College. In short, these are to promote the betterment of the practice of surgery, to improve the surgical efficiency of hospitals, to encourage and endow research, and in due course to create a worthy home for the College and to build up a library and a museum. The two first lie nearest to hand, and it is my privilege tonight to address you on the subject of hospital problems and the education of the surgeon. I may say that this subject was suggested by the Council, and though perhaps I might have been happier with a more technical address, I readily fell in with the desire

of the Council, as I realized that these questions would have been regarded by Syme as taking first place. It may be questioned whether anything new may be said on such topics, as they have already formed the basis of several contributions to the College transactions. I would, however, remind you that reiteration may play its part in driving home a point, for you all remember the story of the famous American teacher of a former day who summarized the treatment of surgical tuberculosis as: "Rest—rest—in the name of God, rest." Also, your gifted national essayist, Walter Murdoch, has observed that platitudes, after all, are forgotten truths, so I feel I may crave your indulgence if my remarks are largely reiterative and platitudinous.

HOSPITAL PROBLEMS.

What, then, are the hospital problems of the day which vitally concern us? They are so numerous and so obvious as to embarrass one in picking the more urgent for discussion. In the main they are the same in our two countries, though we in New Zealand are spared to some extent the out-patient problem confronting you in your great cities. My desire, however, is not so much to discuss hospital systems and their defects, as to advance some views on the educative functions a hospital should serve.

The vital interests of the College of Surgeons in hospital matters concern two great questions: surgical efficiency and surgical education. As regards hospital systems, economy, and so on, we have at present to accept things as they are while political considerations prevail, though we can reasonably hope to exert our influence and knowledge in a beneficent fashion in these general issues by a carefully considered policy which in due course must command public attention and respect. Our policy, then, is one not of dictation or interference, but of cooperation and helpfulness in general hospital matters, and in the much desired event of a non-political hospitals board being set up, the College would expect adequate representation.

We are, however, immediately and vitally concerned, first and foremost, in promoting the surgical efficiency of all hospitals. Hospitals exist primarily for the care of the sick, and who can question our right, nay, our duty, to speak where matters of surgical efficiency are concerned? Secondly, we must urge the wider recognition of the part that hospitals can and should play in surgical education in the broader sense to the benefit of all sections of the community.

I propose to discuss the following hospital problems: (i) Methods of staffing. (ii) Methods of utilizing hospitals as places for the intensive study of certain important diseases, such as cancer, goître, and others. (iii) Methods of utilizing hospitals for the better training of surgeons.

Methods of Staffing.

Let me remind you briefly of the public hospital system in New Zealand to illustrate some of the problems confronting us. In a country

of one and a quarter millions, there are forty-five hospital districts. The hospitals are maintained by a combination of rates levied on the taxpayer and Government contribution, are by law open to all, and patients are charged only for their maintenance, medical treatment being free. Nationalism has been described as the curse of humanity, and certainly provincialism or parochialism and politics have wrought together to bring about a gross multiplication of hospitals in the light of modern conditions, ease of transport *et cetera*, and have thus led to extravagance and by creating a multitude of smaller hospitals, have provided loopholes for surgical inefficiency.

The hospitals in the four main centres and in certain of the other larger towns are completely equipped in the modern sense, and are staffed on the honorary system, with the main exceptions of the X ray and radiotherapeutic and pathologist officers. I think it would be generally conceded that in this class of hospital the level of surgical treatment will stand comparison with that in any other good hospital the world over. The system works and, though it may be extravagant, the patient receives all the benefits of modern hospital organization: consultations in the form of team work in the more difficult cases, specialized services, expert X ray and laboratory services, good records and a steadily improving follow-up system. The College, therefore, can have no quarrel with these hospitals purely on grounds of surgical efficiency. The problems they present are those of everyday experience and are adequately met by the efforts of existing staffs to maintain pride of place and to keep pace with surgical advance. The relations between staffs and hospital boards can, I think, be described as harmonious, and in my experience the board is anxious to meet the requirements of the staff as far as funds permit.

When we turn to the medium sized (one of these contains over two hundred beds) and smaller hospitals, there is not the same cause for satisfaction. The majority are staffed on the stipendiary plan, that is, they are controlled by a full-time superintendent who is responsible for both administrative and clinical work, including all the general surgery. This is the type known as the "one-man" hospital, and it is against this pernicious system that the efforts of the New Zealand Hospital Committee of the College has been chiefly directed, so far without avail. We contend that the defects of this system are twofold: first, one man is relied on to provide the best treatment in all departments of medicine, and his surgical work is subjected to none of the healthy criticism, competition and stimulus to improvement obtaining with an honorary staff, and none of the vast benefit secured by consultation in the more difficult and complex cases; second, the hospital is eliminated and lost as a place of education to other practitioners in the town, some of whom may be well qualified surgeons, to the detriment of their work and to the detriment of that section of the community seeking surgical treatment outside the public hospital. Other obvious defects will readily occur to you, and it is only too evident that here is an evil which the College should strive to remedy.

Our attempts so far have been unsuccessful, though not entirely unproductive. In my opinion, this particular difficulty and other problems relative to surgical efficiency would be best met by pursuing the plan of grading hospitals throughout the country. Where we can learn from other countries we should, and no one can doubt the immense good achieved by the Hospital Committee of the American College of Surgeons by this method of grading.

Our Committee has already put forward to at least two of these "one-man" hospital boards a carefully considered scheme for honorary staffing, and now I believe we could effect great improvements in this direction in New Zealand, and no doubt also in Australia, by following the grading plan. The College should adopt a set of minimum requirements for grade A hospitals, suitably modified in the lower grades according to size of hospital, local conditions, proximity of bigger and better hospitals, practitioners available, and so forth, and obtain the consent of the Ministry of Health for a grading campaign. College representatives who undertook the work of grading would have to be carefully chosen to command the respect of the public and profession, and in New Zealand we have several eminently suitable men available. The grading committee, after its inspection, would issue a detailed statement to the Press, and public opinion, which is often grossly ignorant in hospital matters, would be gradually educated. Each district would desire to see its hospital in the first class, and a carefully worded statement of the reasons for placing it in a lower grade would in due course carry weight, and recalcitrant hospital boards would be forced to fall into line. In the case of small hospitals, due regard would be paid to needs of the particular district, and useful educative work among the public could be done by indicating that, though the hospital fell into a lower grade, it still served their needs, provided that only the simpler types of surgical work were undertaken. The vast body of the public, particularly of the country public, still does not understand that one hospital may not be as good as another, and does not appreciate that the more difficult diseases, such as toxic goître or peptic ulcer, to mention only two, require much specialized investigation before the best treatment can be adopted.

As I have said, the policy of the College is neither dictatorial nor interfering, and I am convinced that the grading of hospitals carried out by the right men on reasonable and diplomatic lines could achieve much good in promoting surgical efficiency, stimulating local pride in hospitals, educating the public and reducing surgical enterprise in smaller hospitals. The help of the Press would be essential. In this way the College of Surgeons would gradually assume its rightful place as arbiter in matters of surgical efficiency and would help in building up an efficient and economical system of hospitals of various grades, each competent to serve local requirements.

It is thus evident that the New Zealand Section favours the honorary system of staffing because it considers it to fulfil the primary requirements of the best surgical service, and at the same time allows the

hospital to play its part in diffusing surgical education to the benefit of all classes. All must admit that these are weighty reasons for such a choice. In point of fact, however, it must equally be admitted that public hospitals, not only in our Dominions, but also in Great Britain, have departed widely from their original conception of places for the treatment of the destitute sick, and are now freely patronized by people who certainly do not fall into this category.

Apart from the considerations already given, the reasons for the general adherence to the honorary system of staffing may be summarized as follows: (i) The honourable tradition of charitable service to the necessitous sick. (ii) The profound interest of the work. (iii) Recognition by would-be surgeons, physicians and specialists that an honorary hospital appointment affords great opportunities for experience. (iv) The belief that the prestige which should be associated with honorary appointments will sooner or later bring a pecuniary reward.

Accepting the situation that the public hospital now serves many sections of the community other than the necessitous sick, it must surely say much for the educational and other advantages of the honorary system that we still recommend it, when in New Zealand hospitals, at any rate, little or no attempt is made to ascertain before admission whether the patient is really a proper person for medical charity.

The plain fact is that we are trying to fit a system which has achieved magnificent work in the past to a new set of hospital conditions materially different, and to the natural outcome of the great advances in medical science *plus* various changes in the social state of the people. The system of charitable and free service through an honorary staff is right, but right only on one condition: that it is restricted to the necessitous, who may or may not be able to pay for their hospital maintenance, but cannot pay for medical attention. Otherwise it comes to be a misguided, unnecessary and expensive charity, at once a degradation to those who receive it and an exploitation of those who give it.

We must not be too free with this unpleasant word "charity", for in New Zealand the majority of people do contribute by direct or indirect tax to public hospitals, and therefore have a claim on admission to them in times of illness. Furthermore, as I have already indicated, the hospital has evolved during the past century to a high state of perfection by a natural and inevitable process marching side by side with the tremendous advances in diagnosis and treatment, and equally therefore must naturally make an appeal to many sections of the community.

Before yielding a blind allegiance to the honorary system, the College must ask itself whether it is desirable to spread the educational advantages of the system too diffusely. Is it not a fact, considering the advanced state of development of our countries, that we are tending to breed a race of surgical practitioners instead of doctors, and are so lowering the general level of surgery instead of raising it? We seem to me to be rapidly approaching the state of the mythical Mexican army, when all are generals and none privates.

Other Methods of Staffing.

If present conditions continue to prevail, I do not see how the Royal Australasian College of Surgeons—in New Zealand at any rate—can steadily uphold the honorary system of staffing to the exclusion of others, for, unless there are material changes, it would seem that some system of part-time paid surgical and other service must come. In large official hospitals in Britain, visiting consultants are now being appointed in increasing numbers, and are paid a salary on the basis of the number of visits.

When the number of people seeking public hospital treatment is rapidly expanding and the number seeking private treatment is rapidly contracting, some readjustment of staffing plans is surely necessary.

University Hospitals as an Experiment in Staffing and Medical Education.

In your great cities with their multiplicity of hospitals there should be room for considered experiment in the matter of staffing, and I should like now to indicate one such possible departure which would be both an experiment in staffing and in medical education.

I believe the natural and logical outcome of the Bosch clinical professorships is the establishment of a University hospital of about two hundred beds, under the direction of the professors of medicine and surgery, and on the lines of the best German or Swiss university hospital clinics. The professor of surgery would have absolute control of about one hundred beds—perhaps rather more—and would have an assistant staff of varying grades of seniority, including assistants in the specialties such as orthopædics and urology, who would carry out certain parts of the clinical and operative work under the professor's direction. Some would be full-time and some part-time, with opportunity of pursuing investigational work. I should like to see this experiment of a true university hospital, controlled by the University and directed by its clinical professors, made in Sydney, and I believe the value of the full-time professorships would be greatly enhanced. The student would benefit and the public would benefit in due course from better trained doctors to the State advantage. Furthermore, a steady stream of men would undergo graduate training as surgical assistants under ideal conditions, again to the public benefit.

I am no believer in a clinical professor being entirely cut off from private practice, and would say that a small number of private beds should be at his disposal in the university clinic, and he should be permitted to charge fees, the fees to go towards improving the clinic, or perhaps to the payment of the assistant staff.

A difficulty would arise from the number of students, but I believe that a university surgical clinic serves its greatest purpose in the early stages and again in the final stages of a student's training. In the intermediate stages surgical teaching would be carried on as at present in existing teaching hospitals, and the work of the other clinical teachers would be facilitated by having students come prepared.

A university clinic should be adjacent to other university teaching departments, and might be alongside an existing hospital to reduce duplication of services.

I believe that a university hospital would so rapidly prove its worth as a vital factor in medical training as to be well worthy of a generous State subsidy. It would have to be financed chiefly by the university and partly by the State; let us hope that another generous citizen like Mr. Bosch will come forward to endow a university hospital and so bring your great experiment to its logical conclusion.

Possible Hospital Developments.

Now let me briefly forecast some of the possible lines of development hospitals may follow in the near future. It is obvious that any ideal hospital system must be designed so that all classes of the community may obtain the best surgical service, gratuitously for the necessitous poor, and at reasonable and graduated cost for those who can pay. How can we attain such an ideal system? By a non-political hospitals control board? By commission? By an enlightened dictatorship?

Let us suppose that the machinery for a radical overhaul of existing hospitals is set up, and call it a hospitals control board. I shall pass over urgent problems which will confront it, such as the reduction of hospital districts and the reorganization of the remainder on a regional basis, the possibility of reducing patients' stay in expensively equipped general hospitals by amplifying convalescent hospitals and chronic hospitals and by a better district nursing scheme, and the devising of a sound system of hospital finance. I take it the slogan of such a board would be economy and efficiency.

It could not fail to be impressed with the fact that the public hospital has become too popular in virtue of its excellence and cheapness, and has come to be regarded, as Victor Hurley[1] so well expressed it, as a public utility and not a charity. The result has been a wholesale demand for public hospital treatment, and its practically free service by sections of the community who are not entitled to such treatment in virtue of their financial circumstances. Owing to the demand, public hospital accommodation has grown far beyond the needs of the necessitous poor, and the cost of the hospitals has multiplied enormously.

It would therefore be the duty of the Board to reduce the country's hospital bill by encouraging a system of intermediate or pay hospitals, where patients will pay for their maintenance, and pay also a graduated charge for medical services. The ways of providing such accommodation are well known: by grafting private wards on to existing public hospitals, by converting present hospitals to the community principle, by providing separate intermediate hospitals through the enterprise of church and other organizations.

In my view, the community principle is the one best suited to the needs of our people. Though there would be difficulties in converting many of the existing larger hospitals to meet the requirements of this

system, it could be readily adapted to the smaller hospitals in either Dominion, and for them, as for the larger hospitals, it is ideal on the vital grounds of economy, efficiency and education. Few can doubt that all new hospitals should be built on this principle, and under the benevolent guidance of a hospitals board they would be correctly placed as part of an organized system.

The adoption of the community principle with an efficient almoner service would preserve the honorary method of staffing, as we strongly desire and urge, but would restrict it to those patients in genuine need of medical charity.

If the community idea is impracticable, then we must urge either the provision of special accommodation reserved at public hospitals for the investigation and treatment of the more complex private cases or the provision of private or intermediate hospitals equipped to meet modern requirements.

So far you will observe I have made little mention of the ordinary paying patient whose patronage allows us to give free service to public hospitals. The College is, in my opinion, fully justified in stating its position, openly and frankly, without fear of accusations of self-interest, for the patients who pay for their treatment and who contribute largely by tax to the support of public hospitals from the privileges of which they are debarred, are surely as worthy of the best service and the highest standard of surgical efficiency as their poorer or necessitous brethren. The point I would make is that hospitals designed for the accommodation of paying patients either of the intermediate class who pay something or of those who pay full fees, should be hospitals worthy of the name, equipped for the modern investigation of the more difficult diseases or built alongside public hospitals to allow utilization of their X ray and laboratory facilities, and not mere nursing homes as many are at present. The matter so concerns efficiency that I make no excuse for pressing it. In many towns in New Zealand, and no doubt in Australia, the facilities for the investigation of paying patients are inadequate, inconvenient or expensive.

If I may be permitted, Mr. President, to give rein to my imagination, my picture of the ideal hospital is one designed for the reception of all classes and built, not haphazard, but as part of a town-planning scheme: a hospital recognized by all as the local centre of medical art, at once a source of civic pride and a worthy object for pecuniary benevolence. The motto above the door would be that of a great hospital I had the honour to serve formerly: "*Patet Omnibus.*"

Compulsory and Universal Sickness Insurance, with Hospital Benefits and Medical Benefits Graduated to Income.

In my opinion, compulsory and universal sickness insurance is inevitable and long overdue. On the Continent, as Newsholme states,[2] national systems of sickness insurance have profoundly modified the hospital picture. He quotes, in particular, Denmark and Sweden, where the official hospitals serve the whole community, well-to-do and poor,

as setting an example to the world in efficiency and amplitude of provision.

I am not competent, nor have I time to go into detail, but I believe that in New Zealand and Australia some form of national universal sickness insurance with hospital benefits and medical benefits graduated to income is not only a pressing need, but would solve many of our hospital and medical problems. There are obstacles, no doubt, but they are not insuperable. In New Zealand we have already gone part of the way by our system of compulsory hospital levy, which naturally encourages the belief that public hospital treatment is a right. Let us take the next and logical step and assist in the provision of a comprehensive national scheme for sickness insurance.

The Hospital as an Instrument for Research and Education in Surgical Problems.

I wish to refer now to the part hospitals can play in the intensive study of various problems of pressing importance and particularly to the formation of cancer and other special clinics. I think there would be general agreement with the view advanced recently by Malcolm Donaldson[3] that, however efficient our voluntary hospitals may be in the treatment of the sick, there can be no doubt that England (and we may add Australia and New Zealand) compares unfavourably with Continental countries in facilities for clinical research. He gives reasons for this appalling waste of material, and states that under our system of staffing and division of beds into a number of small separate units organized clinical research is impossible.

As regards cancer, he summarizes the essentials for clinical research as follows:

1. A team of workers who are prepared to subordinate their own ideas to some extent to the wishes of a committee, the leader of which would be the director.

2. A sufficient number of beds earmarked for clinical research, in which the patients can be kept as long as is necessary for observation. For clinical research in any disease a large number of cases are required, because the number of factors is generally so great that in a small series such factors do not cancel out. In cancer this is especially true, because any deductions from the results of treatment can be of little value until at least five years have elapsed, and this makes it highly desirable to treat as many as possible by the same technique, in as short a space of time as possible.

3. An efficient "follow-up" department, which in turn necessitates the most accurate and detailed records of the treatment that has been carried out.

In the four main hospitals and certain of the smaller ones in New Zealand we have established clinics for the better study and treatment of cancer. Teams have been organized consisting of surgeon, radiotherapist, pathologist, registrar, and in Dunedin we include the Professor

of Public Health and the Dominion Cancer Research Scholar, Dr. A. M. Begg, and call on a physician or specialist as required. These clinics are now in good running order and in a position to make in due course a contribution to the study of cancer in New Zealand by careful observation and a good record and follow-up system. So far the work has been almost entirely restricted to public hospital patients, but we hope by observing due regard to the rights and interests of private practitioners to have more and more private patients referred to us and so to extend the scope of our usefulness.

The clinics are open to all practitioners and members of the hospital staff. They are proving of intense interest and value to the personnel and to spread the educational advantages the surgical members in some clinics are changed annually. We feel sure that the benefits will filter through to the profession generally and lead to a better understanding of the uses and limitations of radium and radiotherapy, to the better treatment of the cancer sufferer. We are, for example, already deeply impressed with the virtues of radium as a treatment for cancer of the breast.

Another obvious line of research and one which will take some years to bring to any result, is the problem of the best treatment of the lymphatic glands in malignant disease. It is evident also that useful educative work among senior students may be carried out through these clinics and this constitutes a sensible field for cancer propaganda.

In Dunedin for the last five years we also have had a goître clinic run on the same lines by a full team, and we hope in time to add to the knowledge of the clinical and other problems of goître in New Zealand.

Other ramifications of this principle in hospital practice are obvious, for example, team work for the better study and treatment of cases of brain tumour, a problem which in New Zealand, with its limited population and widely scattered towns, is one of great difficulty.

The special clinic principle, if judiciously handled, is one method of adding to surgical efficiency, but it calls for some degree of sublimation of self-interest among members of a hospital staff, and most scrupulous observation of the interests of private practitioners. The object should be as with all segregated work, to achieve better results by concentrated study, and then to throw back the knowledge so attained into general surgery for the common benefit.

It is certainly desirable and possible, through organized effort, to make more use of hospitals for clinical research than we do. The primary concern of an honorary staff, however, is with the practical treatment of the sick, and there is little time left for other matters. If the State is going to benefit, as it must in time from the better study, better treatment and better prevention of certain important diseases, then I think it is the State's business to subsidize clinical research effort in some tangible way.

Post-Graduate Surgical Education.

To provide opportunities for the continued and progressive training of doctors is an essential function of hospitals, for, as Abernethy asserted, the hospital is the only proper college in which to rear a true disciple of Æsculapius.

The surgeon who has ceased to learn has ceased to live as a force worth considering in this modern world of surgery, ever changing, ever advancing.

Three classes of graduate require consideration: (i) The young graduate whose career we may mould from the beginning; (ii) the maturer graduate several years qualified who has gone abroad to extend his experience, who returns possessed of a surgical fellowship and desirous of surgical opportunity; (iii) the older surgical practitioner who perhaps works in a smaller or a country town, who desires a refresher course. I will deal with these in the reverse order.

The Third Class.—Many men of this group will choose to go abroad to improve their surgical knowledge. The needs of those who elect to stay at home, and probably their numbers will increase in these hard times, can best be met by post-graduate refresher courses conducted in the university long vacation for four to six weeks. The courses should embrace not only general surgery and the specialties, but also surgical pathology, applied physiology, biochemistry and anatomy, and the services of the younger teachers should be fully utilized. Sydney and Melbourne, with their admirable hospitals, abundant clinical material and highly qualified teachers, could, I am sure, provide most attractive and valuable courses, and, if they chose to alternate, it would be less of a burden on those who teach undergraduates most of the year.

I understand that Melbourne already carries on post-graduate courses successfully, and with further elaboration the needs of the surgical practitioner could be adequately supplied. In my view the essentials of success are suitable instructors and abundance of clinical material, and both are available in your great cities. As regards New Zealand, though I believe such courses could be run successfully, our clinical facilities are less, and I should like to see our men come to you and thus combine the advantages of work under excellent conditions with a holiday at infinitely less expense than involved in a trip Home or to America.

There will always be in both our countries with their widely scattered and often small towns, many men who enter surgical practice after serving a number of years as general practitioners. When the chance comes, they spend a year or two in study abroad, and return to devote themselves to surgical work, alone or still combined with general practice, in big or small towns. They are self-made surgeons to a great extent and many of them with the broad background of general practice are likely to prove their worth, if given opportunity. I do not see how the College can influence the surgical work of these men to

any extent except by helping to fill up gaps in their training by suitable refresher courses.

The Second Class.—Probably more of our young men than yours fall into this group, as it is the almost universal custom for our men to go Home and to stay several years after a year or two in New Zealand hospitals. Many return possessed of the fellowships of the English or Edinburgh Colleges and desirous of practising surgery. All cannot obtain hospital appointments under existing circumstances, and as these men will certainly undertake all surgery coming their way, it is our duty to give them the chance of keeping in touch with hospitals and so of continuing their apprenticeship and developing their judgement by creating as many registrarships or clinical assistantships as feasible. In my own hospital we have instituted two more registrarships to this end, and I believe we can count on the willing cooperation of hospital governing boards in creating such appointments once the objects are set before them. We do what we can, and I understand that Melbourne again is showing the way and has instituted at the Alfred, Saint Vincent's and Melbourne Hospitals a system of clinical assistantships to senior surgeons and wards which promises well. Adelaide is doing the same.

I may say that I personally am not altogether happy about this state of affairs, for I see a danger of the practice of surgery becoming too diffuse for the real needs of a given population, and the general average falling short of what the best might be under a judicious restriction. Registrarships and clinical assistantships should not be indiscriminately provided and recklessly multiplied because of many applicants, but should be allotted only to carefully chosen men likely to benefit and likely to return the benefits by service to the hospital and to the community.

It would seem that the young Australian and New Zealand graduate has an urge, an aptitude, an inclination, a flair, call it what you will, towards surgery. Its high adventure makes an urgent and irresistible appeal to his enterprising spirit, just as the adventure of war drew similar ardent spirits to Gallipoli and produced deeds of heroism, the wonder of the world. There is a danger, however, of our countries becoming overstocked with men of surgical ambitions, but imperfect training, and it behoves all our medical schools and this College to indicate in an authoritative fashion to students and young graduates that the pursuit of a surgical career demands a long and arduous training if we are to fulfil our obligations to the public and to sponsor a race of surgeons worthy of the name, not mere operators.

I need hardly remind you that in some of the older countries, such as Germany and Scandinavia, the law takes this responsibility into its own hands, and men are not allowed to practise surgery until they have served a further five years or more after graduation in pursuing an intensive surgical training in hospital and under supervision. Much misconception exists in the minds of the public, and even in the minds of some young graduates, as to the true significance of the qualification to practise obtained at the end of a minimum period of six years under-

graduate study. It may be the fashion to decry things Teutonic in these days, but I can see nothing but good in a legal insistence on a man not being permitted to practise independently as a surgeon till he has undergone an adequate training over a further period of years.

In my opinion the decentralization of surgery, which to some extent is a relic of the more primitive days in young countries, has gone too far. Any young graduate in deciding to follow a surgical career and to spend some of the best years of his life in equipping himself for it, should remind himself that a certain population can only support, and only requires, a certain number of surgeons, and if he adds up his sum correctly he may be wise enough to plan afresh.

The First Class.—I would have a young man who has shown promise of achievement as an undergraduate and has evinced qualities of mind, heart and hand to his discerning chiefs during his two years' pupilage as junior hospital resident, address some such exordium as this to himself:

> I am irresistibly drawn to a surgical career, but I must realize that though it is a high adventure likely to satisfy my aspirations and to gratify my ambitions it carries great responsibilities. I must therefore equip myself to leave no chinks in my armour. I am ready to give the next five years to training myself for this calling which involves the lives and happiness of my fellow men. I shall first continue my apprenticeship in my hospital for another two or three years as senior resident surgical officer. During this time I shall so impress my chiefs by my zeal and dependability to be sure of a place as registrar or surgical tutor when I give up hospital residence. I shall then begin to diffuse my activities and in addition to part-time work at the hospital in the wards and operating theatres, I shall attach myself to one of the laboratories and carry on some investigation suggested to me by my clinical work. I shall have time for reading, and in the course of another year or so a higher examination will have no terrors for me, because I shall have built so securely that no sensible examiner can fail me. I shall then be mature enough to get full value of study abroad, for my critical faculties will be developed. When I return to my own country, I can reasonably expect the Royal Australasian College of Surgeons to accept me as worthy of their fellowship, and I shall trust to the good sense of hospital boards when an appointment as assistant surgeon falls vacant not to penalize me because I have gone away so that I might serve them the better. In regard to fees, I shall remember that our great master, John Hunter, was extremely liberal in this matter.

Hunter[4] was wont to reply when asked what fee was due to him: "Why, that you must determine yourself; you are the best judge of your own circumstances, and it is far from my wish to deprive you of the comforts of life." These words may sound a little strange, even fantastic, in these materialistic days, but as evidence of a humane and generous spirit they are no mean guide in what is often a difficult matter.

It will be understood that the suggested five-year period of preparation to follow junior hospital resident work cannot be partitioned too rigidly. I would say that about half should be spent as senior resident surgical officer in hospital and the rest in laboratory service, at the same time continuing hospital work as a part-time tutor, registrar or clinical assistant, and finally in study abroad. Laboratory work and service in the dissecting room should be interchangeable with clinical

work after the fourth year from graduation, but the periods must be fitted to the opportunities as they arise.

Let me now elaborate the points indicated in this outline as they may be applied to the training of the graduate whose early career we may endeavour to fashion on a sound basis for the better practice of surgery.

From the inception of the College it is evident that this profoundly interesting problem of surgical training has exercised the minds of many of its fellows. Most surgeons, I imagine, have their moments of retrospection, when they ask themselves: "If I had my time again, how could I have trained myself to better advantage?" Few of us, alas, have our surgical baptism presided over by that very benevolent and good fairy Hamilton Russell so beautifully painted in responding to the gift of his portrait. The answers would be various, and yet I think they would boil down to a few cardinal principles. I will endeavour to set forth these principles as they appear to me, and please note that I am dealing with the young man whose career we endeavour to mould from the beginning, and as I develop my theme please remember also that I am setting up an ideal scheme. I am well aware, however, that it cannot be universally applied because many men have no aptitude for research work, and yet after five years' hospital training may be most excellent practical surgeons. Some may wish to travel abroad at this stage; others may not be able to stay the course for money reasons, but if so minded they will have in the early years of practice time to give to a laboratory and they may make some useful contribution to knowledge. Some few will have the divine gift of original thought and the capacity to put it into action, and these are the men to be nursed, encouraged and helped with such endowments as the College may have in its gift to confer.

The Principle of the Broad Foundation.

I would have our embryo surgeon emulate Jacob, and though I would not insist on his serving a full sentence, I would not consider it a disadvantage in a man qualifying at twenty-four or twenty-five. In my view, he should begin with the broad foundation obtained by two years' service as hospital resident medical officer, including a period of at least six months as house physician. The training in medical wards is invaluable and some of the most promising young men may be so fascinated by the problems of pure medicine as to forsake an intended surgical career. This would be all to the good, for there is a distinct danger of medicine being neglected, and it is the duty of a medical school and university hospital to direct, as far as it can, its men of promise to the greatest advantage to the community. If he elects to follow surgery, his work as house physician is very much to the good, and is not lost time if it has tinctured his outlook with a healthy medical conservatism. Which of us does not lean from time to time on a trusted medical colleague? And who can cleave medicine and surgery into distinct compartments in directing a surgical ward? I often

think that students gain a false impression as they encounter patients in hospital wards nicely sorted into medical and surgical.

Our graduate has now reached the parting of the ways. So far his post-graduate training has been that which all men should follow, whether they are going to be general practitioners or specialists of some sort, and I am glad to say that in New Zealand, with the rarest exceptions, all our graduates follow this course, and thereafter at least 90% proceed to Great Britain and spend two, three or more years gaining additional hospital experience.

The Principle of Continued Apprenticeship.

It is possible in the main hospitals in New Zealand, and certainly in the bigger hospitals of your great cities, to devise a system which will insure an adequate and comprehensive training for those men who elect to follow a surgical career after their probationary post-graduate period and to remain in their own country. We need not fear a narrow or Chauvinistic outlook in these men, for I shall presently refer to the necessity for study abroad.

We come now to our second principle. It is simple like most good things—apprenticeship to a recognized surgeon or group of surgeons in charge of wards, as senior resident officer for another two years at least, and then non-resident or part-time as registrar, surgical tutor or clinical assistant, with the constant opportunity of handling a requisite amount of clinical material (I would say not less than fifty beds), opportunity of assisting the senior surgeon at selected operations, and a graduated and ever-increasing assumption of responsibility in operative work at first under supervision and then independently.

In no other way can a young man develop that sound judgement which is the hall-mark of the safe surgeon, and at the same time cultivate a reliable operative technique, than by working under the generous and liberal minded supervision of a recognized master in surgery. The day of what I call the surgical filibuster should be over, and though occasional comets, like Lawson Tait, have burst on the surgical firmament, most surgeons of eminence owe much of their worth to their days of apprenticeship. We have only to turn for our model to the systems of surgical training as they exist in some schools in Great Britain, in German university clinics and in America, for example, at the Johns Hopkins School, though possibly minor modifications may be necessary to meet varying conditions in our own country. The "firm" or "team" system as obtains in the best British schools meets our requirements and allows the junior members of the firm full opportunity of work under supervision and a graduated assumption of responsibility. More men would be turned out under this system than the big cities could usefully employ, but some would move off to smaller towns and would soon prove the worth of their training to the benefit of the community.

Back to Hunter and Lister.

A reversion to physiological thinking is my third principle, and comes into action when the young surgeon becomes a part-time hospital

officer. May I interpolate to remind the lay friends who honour us tonight that John Hunter was the greatest observer of Nature since Aristotle, and that Lord Lister was the greatest benefactor of mankind, together the brightest stars in our constellation.

Reviewing the more important advances made in the last decade, improvements in the treatment of intestinal obstruction, advances in the surgery of the sympathetic and parasympathetic nervous systems, the fascinating developments in parathyreoid surgery, the better treatment of jaundice and biliary obstruction, to mention a few, it is at once evident that these advances have come from what we may call physiological thinking directed through the laboratories of physiology, biological chemistry and pathology to the elucidation of bedside problems. The work of Royle and your own lamented Hunter must occur to a gathering like this as a brilliant example of physiological thought applied to the advancement of surgery: first the idea, then experimental confirmation, and finally the courage and enterprise to apply it to the human subject. Lister followed the same sequence in his work to perfect the catgut ligature.

The writing is on the wall for all to see and signals a path for the surgical aspirant through the laboratory to his clinical goal. Listen to the words of a man we all delight to honour, Hamilton Russell:[5]

> Go to the laboratory at the university and work at something. It matters little what, so long as you work. Try to find out all about something, and you will soon find that you know more about your subject than other people do. No fragment of knowledge but has its value, and the value will be enhanced to you a hundredfold if it happens to be your own peculiar possession. Its acquisition will surely lead the way to further important attainments until presently the widening sphere of your knowledge will begin to touch at various points the province of the worker at the bedside.

This exhortation of twenty years ago is all the more urgent today.

Who can forecast what beneficent awards await our young men if the active and productive period of their lives is directed along the right channels and not stultified by a desire for a too early and facile material success. Remember Kipling's warning: "A man may be festooned with the whole haberdashery of success and go to his grave a castaway." The late Lord Birkenhead said, in effect: "The world still holds glittering prizes for young men with keen minds and sharp swords." And the world of surgical advance is still not drained of its glittering prizes, although technical surgery may be reaching its zenith as some believe. Too many operations in present day surgery end in "ectomy", and no surgeon leaves the hospital at the end of an operation list which includes, let us say, a thyreoidectomy for exophthalmic goître, a gastrectomy for gastric ulcer, not to mention others, but with an uneasy feeling that he is merely an actor in a passing ablative phase of surgery, though he may have a just pride in his technical achievement. Let our young surgeon be a true disciple of John Hunter, and seek to reduce the number of "ectomies" and he will be adding to the glories of surgery.

The magic word "research" is often too narrowly interpreted. In the realm of pure scientific research many are called, but few are chosen:

in other words, it is given to few to make a discovery of great pith and moment. The great field of clinical research, however, is open to all and offers, as James MacKenzie proved and Lord Moynihan has so eloquently insisted, unique opportunities for extending our knowledge of disordered human physiology.

We do not expect our young surgeon to become a physiologist, but we do expect him after a year or two in a laboratory atmosphere to be imbued with the value of physiological thought. Moreover, the benefit would not be one sided, for there exists today a marked tendency in some quarters to regard physiology, which long ago in Edinburgh was called the institutes of medicine, as a pure science divorced from bedside application. The association of a procession of surgical trainees with a physiological laboratory would help to bring physiology back to the wards, and each would be enriched and quickened by the other, and made capable of better service to the sick, which is the object of all medical training.

The young surgeon must be alive to the possibilities of assistance in his work through the laboratories, for the day of the surgical individualist is over, and team work is the keynote of modern progress. What more brilliant example of cooperation can occur to you than the recent work on the relations between *ostcitis fibrosa* and parathyreoid hyperplasia where the clinician, the biochemist, the radiologist and finally the surgeon work together to bring a hitherto baffling problem to a triumphant issue?

The Principle of Education by Observation of the Work of Other Men in Other Clinics and in Other Countries.

By the end of the fifth year or during the sixth year the graduand surgeon has reached the stage when he is equipped to face any higher examination and to pass it with flying colours. His higher diploma will then stand for something tangible, something worth while, a true hallmark of surgical attainment and competency because it has been backed by proper preparation. Otherwise, it may mean little beyond a capacity for cramming and a certain mental agility. Paradoxical as it may seem, a higher qualification unsupported by adequate training may be an instrument for harm in surgery: an incentive to ill-judged enterprise to the holder and a meretricious guide to surgical competency for the public.

He is now in a position to go abroad and to profit by a critical but appreciative survey of the work in the older medical centres. While we may take pride in breeding a distinctive race of surgeons in this Southern Hemisphere, we must remember that medicine has no international boundaries, and the great things in other countries are freely and generously open to them that seek in the right spirit. The necessity for observation of this principle of education by travel at regularly recurring intervals of years is recognized by all surgeons, though difficult to comply with in times like these. The annual meetings of the College, such as this, help to stop the gaps and bridge the intervals.

One word more before I pass to my conclusion. You will have noticed that I constantly refer to "our young men". As one who has reached the age when, as Osler put it, the silvering of the hair is accompanied by a loss of mental and physical elasticity, I am convinced that it is to the young men we must look for advances worth while. We should encourage young men of promise by giving them opportunity and be gratified to play the part of the trusted and perhaps honoured counseller, though, at the same time, we can reasonably expect a *quid pro quo* in the form of devoted service and a little sacrifice in recognition of benefits conferred. Our late President himself[6] put the case well when he said:

> While to the young is given energy and initiation, let them not forget what others have done.

He went on to quote Goethe:

> If I could give an account of all that I owed to great predecessors and contemporaries, there would be small balance in my favour. In point of fact, we are all collective beings, do what we may, for how little have we and are we that we can strictly call our own property? We must all receive and learn both from those who were before us and from those who were with us.

CONCLUSION.

In conclusion, how can we, the College, assist in pressing forward these objects?

1. By fostering the apprentice principle through advocating the establishment of as many senior resident surgical officer posts as possible, and by a judicious increase in part-time posts of the registrar, tutor and clinical assistant type. There is still plenty of room for an extension of the "firm" or "team" principle in many of our hospitals and cost should be no serious obstacle.

2. By encouraging and endowing laboratory and research work. If we can take present accomplishment in the form of existing endowments—I refer to the Syme and Craig bequests—as promise of future achievement in this direction, we have cause for satisfaction. We live by the misfortunes of others, and where we can we should put back some of our profit into surgery for its betterment. How can we do this better than by assisting the education of the most promising of our future surgeons in the later years of their training, when they should be turning to the laboratory and are likely to find financial stress so great as to force them into practice? We often speculate as to the loss to the world caused by the destruction of incalculable genius in our youth by the Great War; we may similarly speculate as to the loss to scientific surgery due to bright spirits being driven to premature practice with all its distractions. If the College does nothing more than build up a strong system of research endowment, it will make a contribution to the life of our body politic.

We aim at much more, but time permits me to touch only on the fringes of our ambitions. We look forward to creating a worthy home

for the College, and it is a matter of satisfaction that the building appeal has, even in these difficult days, met with a generous response from Fellows. That Melbourne has been selected as the place in which to establish it is, I think, regarded by all as a fit and proper choice, for, apart from geographical advantages, Melbourne surgeons played a valiant rôle in launching the College.

But bricks and mortar in themselves are dead things, and two other aims, both educational factors of the highest importance, must be accomplished before the College building becomes a vivifying force in the surgical life of this hemisphere. When we have built up a library and created a museum, then will the headquarters of the College of Surgeons stand as a lasting memorial to the motives of our late President and his co-founders and to their successors must it ever be a source of pride and an incentive to advance our art. In short, if I may paraphrase Thomas Fuller, it will serve to remind us of our bounden duty—to better our surgical heritage and what our predecessors found glass and made crystal, we shall find crystal and make pearl.

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THE VALUE OF PERIMETRY.

By J. RINGLAND ANDERSON,
Melbourne.

THE introduction of perimetry, like so much else in ophthalmology, was due to Albrecht von Graefe. When we remember that Hippocrates was aware of such a defect as hemianopia, it is surprising that its importance in medicine had to await the fertile mind of von Graefe for recognition.

THE MEANING OF PERIMETRY.

If perimetry means simply, as unfortunately in practice it often does, the measurement of the extent of the field of vision, then it is time a new term was applied to this important branch of ophthalmology. If, however, by perimetry we mean the exploration of the visual field, and not simply a study of its margin, then the term is given its full meaning. "The normal field has not only normal peripheral limits, but has also normal visual acuity over its whole surface." The perimetrist therefore must not simply sail round the coast as if on an orographical expedition, but he must follow the example of the scientific explorer as he takes contours, estimates heights, and measures the depth of valleys and of lakes. For, as Bjerrum and Rönne have emphasized, a quantitative estimation of the field of vision is essential. Traquair has pictured the area of keen macular vision as a sharp pinnacle in the centre of an island of vision in a sea of blindness. The blind spot then resembles a pit with almost vertical sides, extending down to the level of the surrounding sea.

An exploration of the projected field of vision means an estimation of the thresholds of its complete area for colours as well as for white, and it should include the variations effected by alteration in illumination. As such it is an almost complete investigation of the function of the second cranial nerve, leaving only the more minute examination of the most acute or macular vision to such tests as reading types, near and far, and apparatus for the study of central colour vision and light sense.

THE METHOD OF PERIMETRY.

In perimetry one maps out the margins of the field with various sized test objects at different distances. The extent of the visual field increases as larger objects and greater distances are used. The successive margins, which are more or less concentric, are known as isopters. Each isopter can be denoted by the size of the test object used and

the distance at which it was used. This is expressed, for example, as follows: $\frac{2\text{ (mm.)}}{320\text{ (mm.)}}$ or $\frac{1\text{ (mm.)}}{2000\text{ (mm.)}}$. For shorter distances, usually about a third of a metre, a perimeter is used; for distances of a metre or more a screen is essential.

Just as a minute object can be seen more clearly in the centre of the visual field than peripherally, so vision may vary in the various sectors of the periphery. It is found that a minute test object seen at the extreme nasal periphery may be invisible at the extreme temporal periphery. The smallest test object which can be seen at the edge of the nasal field is one subtending an angle of 34·2°, $\frac{10}{1000}$, whereas in the temporal field such a test object is seen only to 93°; and yet the full temporal field as determined with a larger object, $\frac{160}{1000}$, extends to 107°. So there is a higher threshold at the periphery in the nasal field than in the temporal, or one may say several isopters coincide in the former, whereas they are separated in the temporal field. In other words, the nasal margin is steep, but the boundary or coastline of the temporal field slopes gradually. Those parts of the field limited by the brow or lids are similar to the nasal field in this respect. As a result of this variation in steepness the temporal field shows a visual loss earlier than the nasal field when a field is concentrically contracted or generally depressed. This observation makes clear one deficiency in most perimeters, namely, that readings cannot be made in the temporal field at a point further round than at right angles to fixation. This deficiency is of no great importance, however, if one uses test objects which are small enough, 0·5 or 1·0 millimetre at 330 millimetres. Many a peripheral defect and central scotoma have escaped recognition because the observer has been satisfied with a five millimetre test object. According to Traquair's metaphor, perimetrists seek in the dark for pits or fissures on the surface of an island, the normal contours of which are known, and if they seek with too large a stick or rod, they may miss small but important defects.

The only reference that I wish to make to the construction of, or to the use of, a perimeter, is the following quotation: "Simple tools, properly used, are much less productive of wrong conclusions than undue reliance on the dicta of an elaborate instrument" (Traquair). Rönne has stated that perimetry, of all ophthalmic examinations, is perhaps the one which requires the most experience and detachment. This is why Cushing finds that even many ophthalmologists regard it as "a form of drudgery from which busy practitioners gladly escape". Traquair refers to the fact that Bjerrum "discovered more than thirty years ago that he could obtain more information by using the back of his consulting-room door than he could from the ordinary perimeter". It is well to add that simplicity is an essential in the perimeter, but the simplicity of the physician who relies on the confrontation method—the approximate estimation of a field when the patient is seated opposite the observer who moves his finger—is foolhardiness. A negative result by such a test may postpone or prevent a thorough investigation.

THE TEMPORAL FIELD OF VISION IN HEALTH AND DISEASE.

To make clear the great value of perimetry, let us study particularly the temporal half of the visual field. Let us consider its normal extent and surface, and then study its alterations in these respects as disease and injury narrow its boundaries, develop blind spots or scotomata on its surface and reduce central vision as the macula is affected.

The value of the temporal field of vision is perhaps only fully realized by those who have lost it. Not only on the field of sport and in the workshop, but in everyday life does such a loss lessen one's efficiency. A partial loss may some day debar one from a driver's licence. It is the loss of the temporal field that often misleads a patient with hemianopia into the belief that one eye alone is affected. He considers, for example,

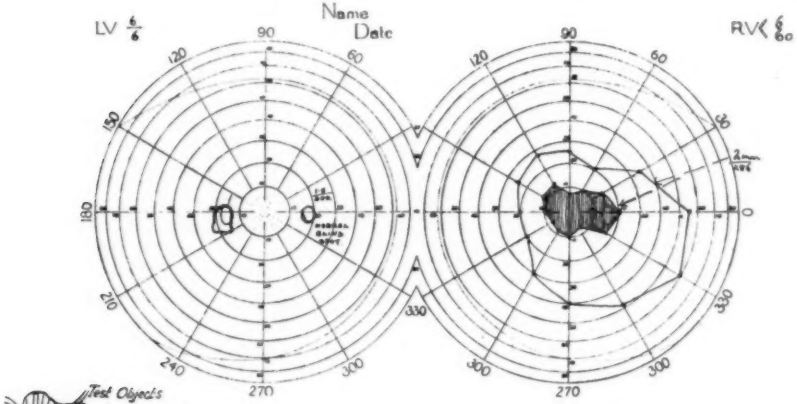


FIGURE I.

FIGURE II.

that his right hemianopia means blindness of the right eye, for it is the loss of the right temporal field that is forced on him. The nasal field may fail as in glaucoma, and the patient not miss it, for when both eyes are open, one nasal field overlaps the other. In the binocular field of vision, the temporal field is overlapped by the nasal field of the other eye only to a point 60° from the object looked at, while the normal field extends a further 50° temporally. The temporal field is consequently partly unpaired. If the temporal half of the field of each eye is blinded, as in bitemporal hemianopia, the total visual field has a diameter of only about 120° instead of over 200°.

Another feature of the temporal half-field of vision that requires consideration is its wideness. The normal nasal field is only just more than half as wide as the temporal field, and it may be further reduced

by the presence of a large nose. Eccentric fixation in perimetry enables one to distinguish a loss due to such a cause from the similar loss so common in glaucoma (Figure III).

The temporal field of vision is also worth extra consideration, because it contains the blind spot. This normal scotoma is due to the projection into space of the optic disk, the head of the optic nerve, which is insensitive to light. Its extent may be increased by the presence of opaque nerve fibres (Figure I), of papilloedema and as a result of the disk cupping in glaucoma. Above and below this area one can, with small test objects, delimit the branching blind strips which are due to the central retinal vessels near the disk margins (Evans). The area

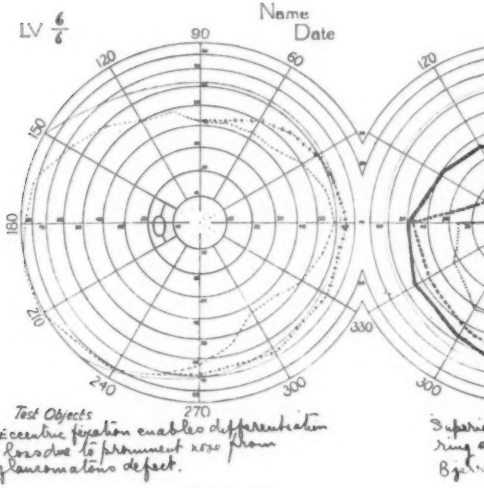


FIGURE III.

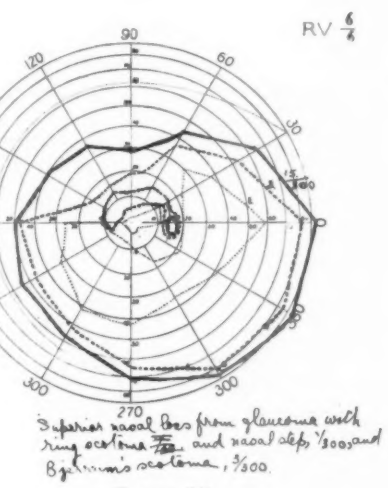


FIGURE IV.

between this blind spot, the *area caeca*, and the macula or fixation area is the centro-caecal area. Its importance will be referred to later.

DISEASE OF THE RETINA AND THE CHORIOID.

Any lesion in the nasal half of the retina or any chorioidal disturbance which interferes with its nutrition, will produce a loss in the corresponding temporal field of vision. Such a loss is rarely complete, or, if so, it rarely resembles the blind half-field, the hemianopia, which we associate with lesions affecting the nerve fibres between chiasma and cortex. If the retinal cells are affected, there may be either a round, an irregular or an annular scotoma. If, however, there is a lesion of the nerve fibre layer, there will be a sectorial defect which corresponds with the area of the retina from which the fibres come. Such sectorial defects are referred to as arcuate or cuneate scotomata, according to their shape.

In common with the temporal field, the nasal field may exhibit such defects as the result of disseminated chorioiditis, *retinitis pigmentosa*, detachment of the retina or chorioid, and other conditions. Scattered scotomata characterize the first of these diseases. In *retinitis pigmentosa* a ring scotoma may appear before the fundus changes are visible. When more advanced, the field loss may include all except the macular area, and a crescentic remnant in the temporal periphery (Figure VI). This remnant may aid in distinguishing this form of retinitis from a disseminated chorioiditis which at times so closely resembles it.

Careful perimetry is of assistance in studying the progress of a retinal detachment and its response to treatment. It is sometimes of

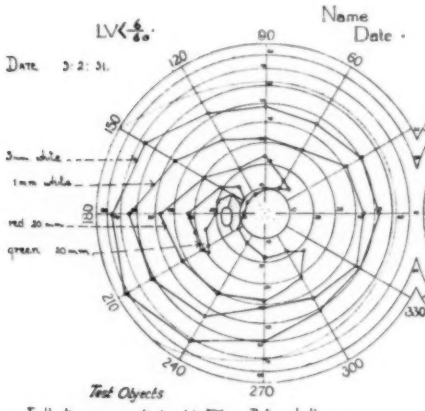


FIGURE V.

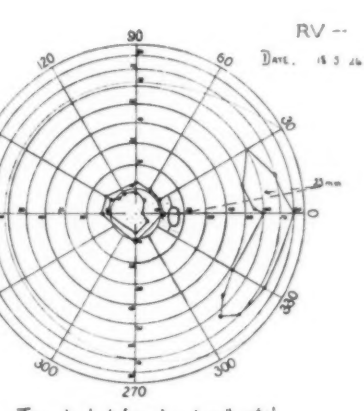
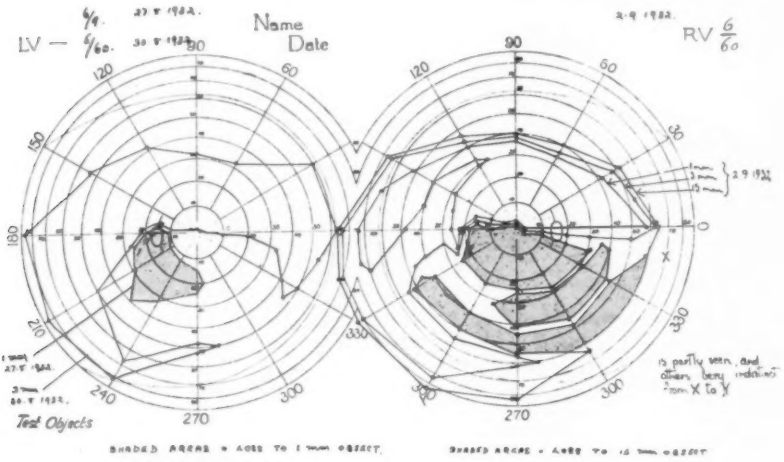


FIGURE VI.

value in helping the observer to distinguish a simple detachment from one that is secondary to a chorioidal sarcoma. The latter is characterized by a scotoma, the completeness of which varies with the pressure on the outer retinal layers. The ductility of the inner retinal fibre layer is shown by the manner in which the tumour can push through between fibres without leading to a sectorial defect. When an effusion of fluid occurs, the characteristics of a simple detachment are added. The field for blue is then usually more affected than that for red, and true interlacing of fields may occur in which the red field overlaps the blue. This loss, due to the secondary detachment, may soon become greater in extent than that due to the initial lesion itself.

A radiate or arcuate scotoma may cross the temporal field in papillœdema or if a focus of chorioiditis develops close to the disk, so-called *chorioiditis juxta-papillaris*. But it is in glaucoma preeminently that lesions due to interference with nerve fibres at the disk occur.

Even though the early changes in glaucoma are in the nasal field, certain of its effects will be referred to in this paper. The earliest change to occur is a general depression of the field. This is soon followed by a better known sign, enlargement of the blind spot. Tuft-like scotomata appear at the superior and inferior margins of this spot, and as they extend in an arcuate fashion round the fixation area, they form the well-known scotomata first described by Seidel. When these extend further and approach the horizontal meridian on the nasal side, the defect is known as Bjerrum's scotoma. When this reaches the somewhat contracted nasal periphery the characteristic gross nasal loss is produced.



Retrobular neuritis.

FIGURE VII.[1]

3 DAYS AFTER

FIGURE VIII.

When one arm of the scototoma extends to the nasal horizontal meridian before the other, the characteristic nasal step is produced. Later a complete ring scotoma may be formed around the centro-caecal zone (Figures III and IV).

It is difficult to explain the early picking out of certain fibres as they leave the optic disk. Traquair considers that the earliest affected fibres are those which lie close to the large retinal vessels, because their blood supply is earliest affected by the elevated pressure. The early tuft-like outgrowths from the blind spot resemble the small branched physiological scotomata due to the large retinal vessels at the disk margin.

Perimetric findings support the view that it is the pressure on, and the nipping of, the fine arterial vessels rather than direct interference

[1] Figures VII and XII represent fields of the left of a patient with unilateral retrobulbar neuritis which rapidly progressed and regressed. There were no signs of rhinological or neurological disorder.

with the nerve fibres at the cup margin, that is the cause of the early visual loss. It appears that the effect that glaucoma, primary or secondary, will have on the visual field will depend on the alterations effected in and around the disk by the rise of tension. "Cupping is always associated with field changes." Typical field changes rarely exist without a cup. Traquair considers that though extreme cupping and extreme nasal pallor are usually associated with extreme field loss, yet neither the position nor the degree of field changes can be inferred from the appearance of the disk. Just as there is a large personal factor in the diagnosis of temporal pallor of the disk, so there is difficulty at times in the

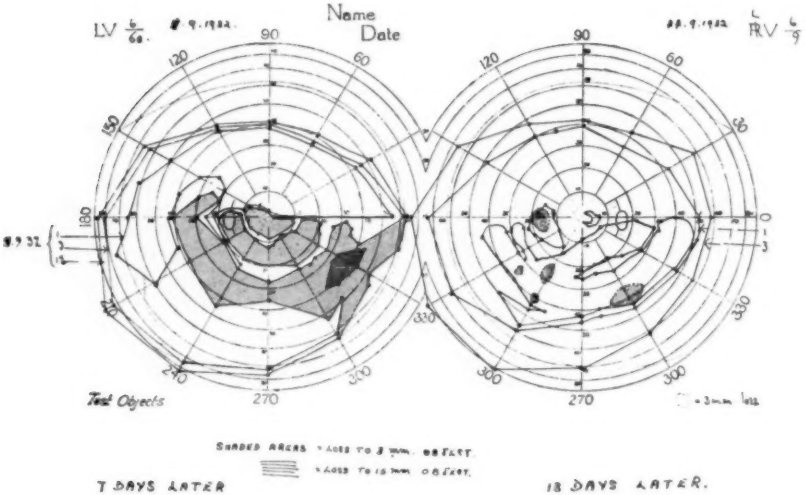


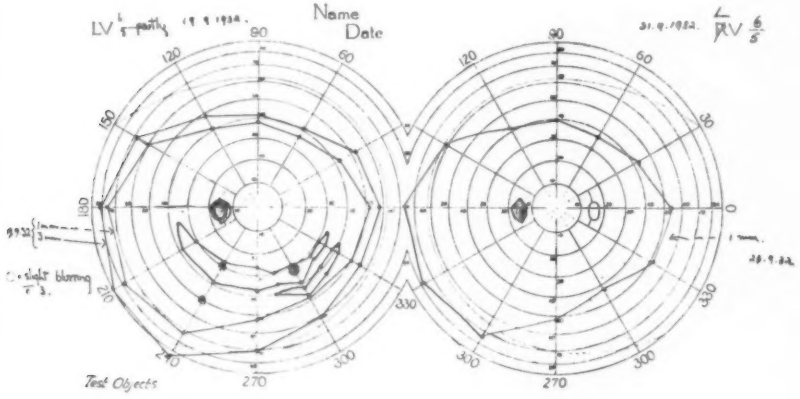
FIGURE IX. FIGURE X.

determination of pathological cupping. Such causes of uncertainty force one to rely on perimetry rather than on ophthalmoscopy in the recognition of early glaucoma on the one hand and of early optic atrophy due to a suspected suprasellar tumour on the other hand.

The temporal field of vision is served by those fibres which cross at the chiasma. It is well to remember that these are not simply the fibres from cells on the nasal side of a vertical line through the disk, but also those from cells on the nasal side of a similar line through the macula. Throughout their course back to the chiasma these fibres retain approximately their retinal relationship. Immediately behind the eye they constitute the medial quadrant of the nerve; the papillo-macular bundle lies laterally to them and divides the temporal fibres or uncrossed fibres into an upper and a lower bundle.

OPTIC NERVE.

When we come to consider lesions of the optic nerve we find many which affect the temporal field. The characteristic loss in tobacco amblyopia is a bilateral centro-caecal scotoma, with a core or nucleus of very intense loss. It is not a true central loss, for, as in many cases of retrobulbar neuritis, it is due to a lesion which affects almost entirely crossed fibres. No structural or vascular feature can account for this predisposition. It is only in late and severe cases of tobacco amblyopia that the macula is affected. Even in the most advanced cases no other field change develops. This limitation suggests that certain fibres are specially sensitive to the poison. The reason for this is



21 DAYS LATER
FIGURE XI.

23 DAYS LATER.
FIGURE XII.

unknown. It is insufficient to state that these fibres are more highly specialized or that they are more vulnerable, because they evolved later than other fibres. Complete abstention from tobacco is not necessarily followed by an immediate improvement of vision. The progress may be slow. Only careful perimetry, however, can satisfy the mind of the observer, when he begins to doubt his diagnosis and wonder whether the lesion may not be a pituitary tumour. In the latter the horizontal core of the tobacco scotoma is absent, the colour field is less affected, and quadrantic features are usually present. In considering any central loss it is necessary to exclude these two diseases, and it can be done only if the characteristics of the scotomata are proved to be absent.

A central scotoma is the characteristic defect produced by poisons which are apt to cause peripheral neuritis, such as alcohol, lead and those active in diabetes and beri-beri, whilst quinine, the organic pre-

parations of arsenic, and the salicylates cause an irregular peripheral defect, and no characteristic central loss.

The periphery, when affected by drugs, does not tend to recover, but the papillo-macular fibres and their ganglion cells have a marked tendency to recover from the effects of most poisons and of pressure. Possibly this is due to a variation in the richness of blood supply. The peripheral defect due to quinine, which is probably the result of an ischæmia of the retinal artery, tends to be permanent. Trypsarsamide and the pentavalent arsenic compounds penetrate into the central nervous system more rapidly than trivalent compounds, and this may explain the ill effects due to such compounds. Defects due to arsenic tend to

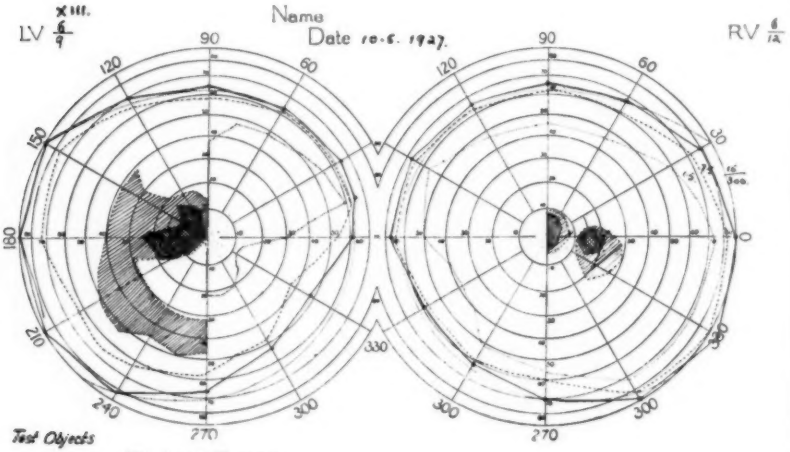


FIGURE XIII. Showing fields of a patient with amenorrhœa (five years), failing vision (five months), and marked erosion of posterior clinoid processes. Treated by deep X ray therapy (Dr. L. A. Love) with marked improvement of visual fields and return of vision from $^6/_{12}$ to $^6/_5$ partly in the right eye and from $^6/_9$ to $^6/_5$ in the left. Six years later central vision was unimpaired, but fields were as shown in Figure XIV. The X ray appearances were unaltered.

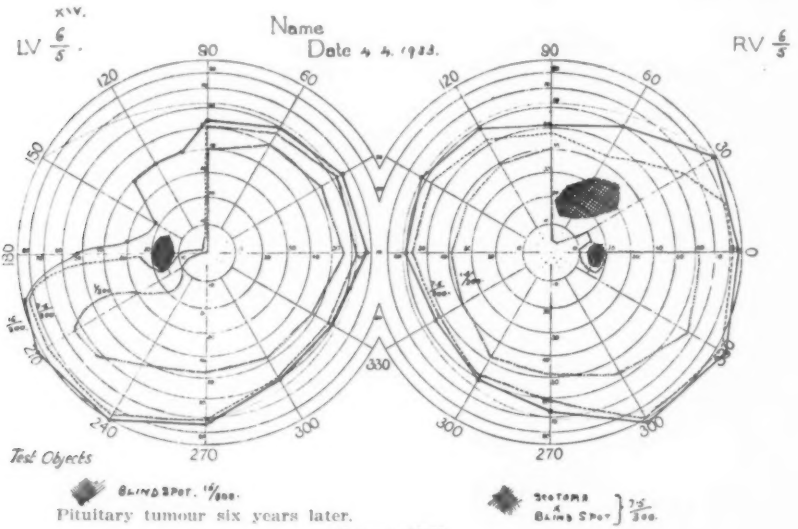
progress. Alcohol produces an intense central scotoma which does not tend to recover as do scotomata due to other drugs (Figure II).

Acute retrobulbar neuritis produces as a rule either a central or a paracentral scotoma of unilateral incidence and with a tendency to recovery. If nerve fibre bundles are affected, arcuate defects will develop. This never occurs in tobacco amblyopia. In retrobulbar neuritis, as Uhthoff pointed out, the red and blue loss is almost equal, whilst in tobacco amblyopia the loss for blue is less and occurs only in the central cores or nuclei.

One of the common causes of retrobulbar neuritis is disseminated sclerosis. Apart from the other findings suggesting scattered lesions, the

transient and inconstant nature of the defects in the field suggests the presence of this disease. The scotoma may alter in shape, intensity and even position. A pressure defect, whether from tumour or mucocele, arises more gradually, and does not fluctuate. A central loss when due to pressure is at times accompanied by an adjacent sectorial defect (Figures VII and XII).

In the Old World, disseminated sclerosis is a common cause of acute retrobulbar neuritis. In America and in Australia this disease is more rarely seen, and the development of retrobulbar neuritis is considered due chiefly to septic infection. Wilmer found disseminated sclerosis to be the cause in 11% of a series of cases of chronic retrobulbar neuritis. Traquair considered it to excite from 20% to 40% of cases of retrobulbar



Pituitary tumour six years later.

FIGURE XIV.

neuritis, while the average percentage in the recent series of three German writers is 68%. Probably an accurate estimate is 50% (Gifford). The differential diagnosis is difficult because as a rule this neuritis develops when the other symptoms of disseminated sclerosis are few or absent. Hansen found that such scotomata nearly always cleared up within three months if no other nerve symptom was present or developed during this period. Even the most gross loss may disappear, provided it was not too gradual in developing. The good prognosis and the fluctuating course depend on the patchy nature of the inflammation, and the characteristic resistance of the axis cylinders to this infection.

At times infection of the sphenoidal sinus or the posterior ethmoidal air cells may cause a central scotoma. This defect (Figure V) is more

persistent, and fluctuates less than that due to disseminated sclerosis. Repeated careful perimetry is of the greatest value here. Traquair prefers to consider the lesion as due to impaired nutrition of nerve fibres from venous congestion, rather than to actual extension of the inflammation or to intoxication. Peter emphasizes the part possibly played by the posterior vein of Vossius, which, after entering the optic nerve in the optic foramen, occupies the central position adjacent to the papillo-macular fibres. Into this vein pour tributaries from the nose and the posterior orbit.

Much uncertainty exists regarding the frequency of rhinogenic retrobulbar neuritis. Many British ophthalmologists consider sinus infection

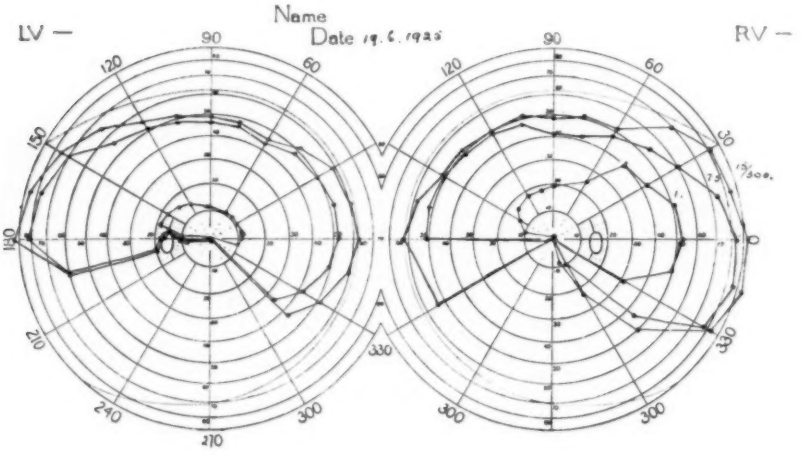


FIGURE XV. FIGURE XVI.

an extremely rare cause of retrobulbar neuritis (Mayou). Estimates vary from this to percentages as high as 90%. Though there appears to be a geographical variation, yet the investigations carried out by those who claim the higher percentages are not scientific. Gifford's estimate of 3·5% is probably the most accurate. White stated that infection from teeth and tonsils accounted for 73%. However, in some of these cases a failure to react to the Wassermann test with a positive Lange curve of the cerebro-spinal fluid or the developments of later years might have revealed disseminated sclerosis as the cause. Restoration of vision after a nasal operation does not necessarily prove a causal relationship. Cases have been reported in which later developments proved the presence of disseminated sclerosis. For a time following the publications of

Sluder, Schaeffer and others in America, the slightest sinus disorder was considered to be a likely cause of retrobulbar neuritis. White, during this period, reported seventeen consecutive cases. Later, with many others, he changed his views, as the figures just quoted show. The results of treatment in his two series were similar: 50% of his patients regained normal vision and the vision of 25% improved. This tends to support Weill's finding that in 85% vision was recovered without surgical interference. It is important to remember that the centro-caecal type of scotoma, which is so characteristic of tobacco amblyopia, is much less commonly due to disseminated sclerosis than to sinus infection.

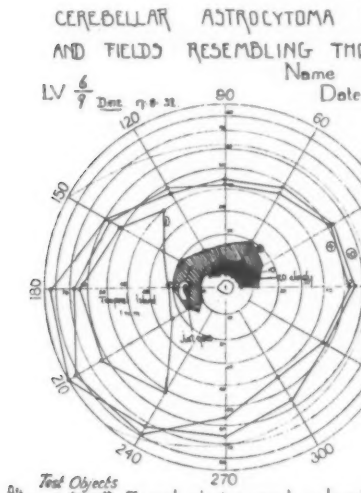


FIGURE XVII.

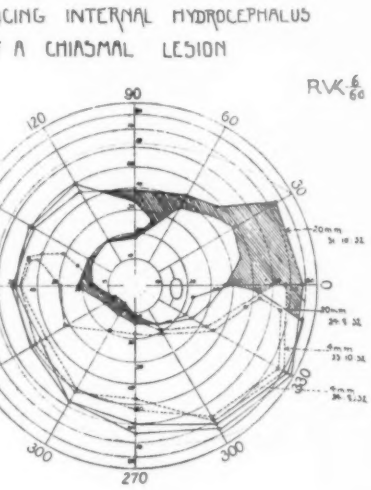


FIGURE XVIII.

If the scotomata exhibit hemianopic or quadrantic features, disseminated sclerosis or pressure from a chiasmal lesion is most probably the cause. The nerve close to the chiasma is a favourite site for disseminated sclerosis. A lesion here may produce not only a loss in the field on the same side, but also a loss in the temporal field of the other side, because of the presence of the knee of crossed fibres in the termination of the nerve. The existence of this knee will be explained shortly.

Ophthalmoscopy reveals the presence and the evolution of a papillœdema, while the perimeter discloses the visual loss due to the subsequent optic atrophy. The temporal field will show an enlarged blind spot or a pericaecal scotoma, and if the macula is œdematous, a

relative central scotoma as early changes, but a peripheral or concentric contraction shows that atrophy is commencing. Except in very advanced cases the central loss is small compared with that found when a similar fundus picture is due to a local optic neuritis. The retention of full central vision in papillœdema is an all too common cause of delay in the recognition of brain tumours.

It is well to remember that the average length of the optic nerve between the chiasma and the optic foramen is 13 millimetres. There is therefore a considerable length of nerve exposed to the influence of intracranial disorder. A frontal lobe tumour or abscess may cause a homolateral optic atrophy and a contralateral papillœdema. One

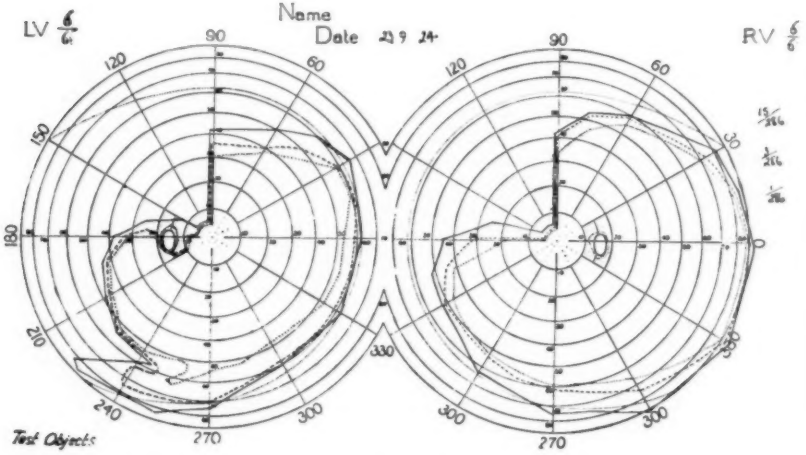


FIGURE XIX.

Permanent homonymous quadrantic loss developing during attack of Migraine. Unchanged 5 yrs later.

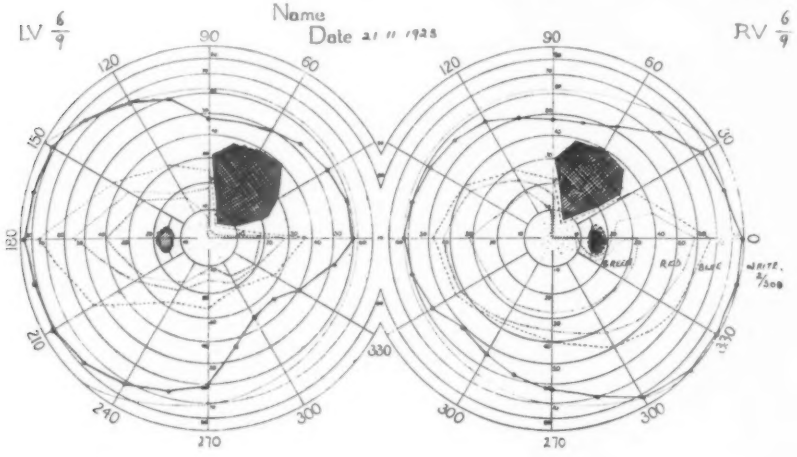
FIGURE XX.

wonders if routine tests of smell and of fields would reveal more frequently the so-called Foster Kennedy syndrome of unilateral anosmia, homolateral visual loss with primary optic atrophy, and later contralateral papillœdema and complete anosmia. Olfactory groove meningiomata, and orbito-ethmoidal osteomata are described as not uncommon causes of such signs.

Only a lesion of the retina or of the optic nerve can cause a unilateral field defect, which involves both temporal and nasal areas. A bilateral defect of this type must be due to a lesion of both nerves, unless quantitative perimetry reveals hemianopic features, when the cause might be pressure at or above the chiasma (Figure XXXI).

THE CHIASMA.

The body of the chiasma lies over the posterior half or two-thirds of the pituitary fossa. "There is, therefore, a free triangular space in front of the chiasma, in which the anterior half or even more of the pituitary body is exposed, covered by the diaphragma." De Schweinitz found that in 4% of skulls the chiasma was actually situated behind the fossa, and lay on the *dorsum sellæ*. The chiasma is "suspended in and surrounded by the cerebro-spinal fluid except at its posterior border", where it is in close contact with the infundibulum (Figures XVII and XVIII). As the chiasma is embraced by the circle of Willis, the field defects resulting from thickening of these arteries will vary according



Permanent, stationary homonymous quadrantic loss following intense hemicrania, and transient hemianæsthia and complete hemianopia.

FIGURE XXI. FIGURE XXII.

to the several variations in their course and communications. Gowers showed that 50% of basal aneurysms were close to or involved the circle of Willis. Such an aneurysm may be revealed by the effects of gradually increasing pressure on adjacent structures, or, when it leaks, by a sudden and severe headache, involvement of cranial nerves and blood in the spinal fluid. Then in the absence of Koenig's sign and pyrexia, a diagnosis of subarachnoid hæmorrhage can be made.

A knowledge of the distribution of the fibres in the chiasma is essential for the interpretation of the defects about to be discussed. In each optic nerve the fibres have a retinal grouping, that is, fibres from adjacent parts lie together. In each tract the fibres from the homolateral half of each retina are collected, so that we find in the

right optic tract the fibres from the right half of each retina, or from the left half of the visual field of each eye. The necessary reshuffling occurs in the chiasma. As already stated, the crossing of the fibres is not by the most direct route. The most anteriorly placed of the ventrally situated crossing fibres bend forwards into the beginning of the opposite optic nerve. The most posteriorly placed fibres of the dorsal group extend into the homolateral optic tract before crossing the mid-line. The loops or knees so formed make the fibres involved liable to interference by lesions of either the optic nerve or the optic tract, if such lesions be sufficiently close to the chiasma.

Because of its early disappearance, the temporal field assumes special importance in chiasmal lesions. Though homonymous changes may appear, the characteristic defect from such lesions is a bitemporal hemianopia (Figures XIII and XIV). These losses are considered to be due to the influence of pressure, of traction or of toxins. Pressure implies not simply direct interference with the nervous structure involved, but also interference with the blood supply to the part. Therefore, the actual lesion may exist at some distance from the situation of the cells and the fibres that appear to be affected.

The most typical early change is a depression in the upper outer quadrant; the field shrinks in this area. The vertical boundary of this defect is steep and ultimately perpendicular. A similar boundary is characteristic also of the central quadrantic scotoma, which usually develops early. These areas of loss combine, and then extend into the lower outer quadrant, and, on meeting the shrinking peripheral field, they cut off a temporal island of vision. These changes are at first relative, and later become absolute. The island disappears, and the lower nasal and finally the upper nasal quadrants are affected. Before this occurs, however, a halt may occur. This does not mean an arrest in the progress of the lesion, but rather its upward growth into the brain. As the crossed fibres from the lower inner retinal quadrants of each eye lie in the ventral part of the front of the chiasma, a medial tumour growing beneath the chiasma and pressing up against its inferior surface affects them first. The next fibres affected are those from the upper inner retinal quadrants, for they cross in the ventral part of the middle and posterior regions of the chiasma. The frequency with which the temporal island occurs suggests that the corresponding fibres lie laterally and so closer to the uncrossed fibres. Its presence therefore suggests a medial lesion. The absence of this island aids the recognition of those tumours which lie between the optic nerves and produce a bitemporal hemianopia.

Schaeffer, in 1922, investigated 125 freshly exposed brains in bodies soon after death, and his findings are of great interest. The space between the basal surface of the optic chiasma and the upper surface of the diaphragma and the hypophysis was found to vary from a potential cleft to a vertical interval of ten millimetres. When the latter condition was present the hypophysis would have to double in size before the chiasmal fibres could be affected by pressure of stretching. This and

other findings suggest that either toxic influence or interference with blood supply may be the actual cause of chiasmal disturbance.

SUPRASELLAR TUMOURS.

The characteristic field change when the chiasma is affected by a suprasellar tumour is a bitemporal loss which progresses from above downwards. As a rule, such a tumour tends to compress and separate the optic nerves as it lies between them, and it is later straddled by the chiasma. Sometimes the four upper quadrants are affected first and an altitudinal hemianopia appears. If, however, a meningioma arises somewhat anterior to the *tuberculum sellæ*, it may extend over the upper surface of the chiasma and a bitemporal loss affecting only the lower quadrants results (Figures XV and XVI). Such a field loss is strongly indicative of a suprasellar tumour, whereas if the upper half of the field is the first affected, the lesion may be either intra- or extra-sellar (Brouwer).

Cushing and Holmes have remarked on the frequency with which they have found the field of one eye much more affected than that of the other. Cushing reported a patient whose left temporal field was affected eight years before a similar loss in the right field was found. The combination of bitemporal hemianopia with one field specially affected by the stretching of its optic nerve as it leaves the optic foramen should lead to an early diagnosis. This asymmetry, or delayed succession, is the only perimetric feature which aids in distinguishing such growths from cysts of Rathke's pouch, or from tumours of the stalk or the pituitary body itself. Evidences of endocrine disturbance or of radiological alteration may also assist. There are, however, no definite signs of value for the differentiation of a suprasellar tumour from a basal aneurysm or chronic arachnoiditis. The presence of such a tumour must always be considered a possibility in "middle-aged patients who present symptoms of slowly progressive damage of one optic nerve in the form of either temporal or central blindness associated with primary optic atrophy, with at first but little evidence of increased intracranial pressure and no endocrine disturbance, and in which radiographs reveal neither distension of the sella nor shadows above it" (Holmes). The absence of the reactive hyperostosis so common in meningiomata in other situations makes perimetric findings of greater value (Cushing and Eisenhardt). A warning should also be given regarding the fact that the commonly observed central field loss has often led to a hasty diagnosis of retrobulbar neuritis, and subsequent extensive dental and rhinological sacrifices.

In all these investigations one should rely on team work. Such cooperation should not only insure thoroughness, but also lessen dogmatism. For just as a normal *sella turcica* and absent endocrine disturbance do not exclude the presence of a tumour, so the presence of pituitary disorder with bitemporal field loss does not necessarily prove the existence of a pituitary tumour.

The slow growth of certain suprasellar tumours has recently been reemphasized by Borel. The first sign of disorder in one patient was a defect in the colour field when he himself painted this field. The next sign may be revealed only to a neurologist of the following generation. In one patient, a so-called neurasthenic, a bitemporal dyschromatopsia was revealed by the painting method. Twelve years later a hemianopia appeared, and after twenty years atrophic disks were detected. Thirty-seven years later at autopsy a suprasellar "psamomma" was found. It is no wonder that Charcot said: "*Le champ visuel personnel des couleurs était le plus fin moyen de diagnostic cérébral qui se puisse concevoir.*"

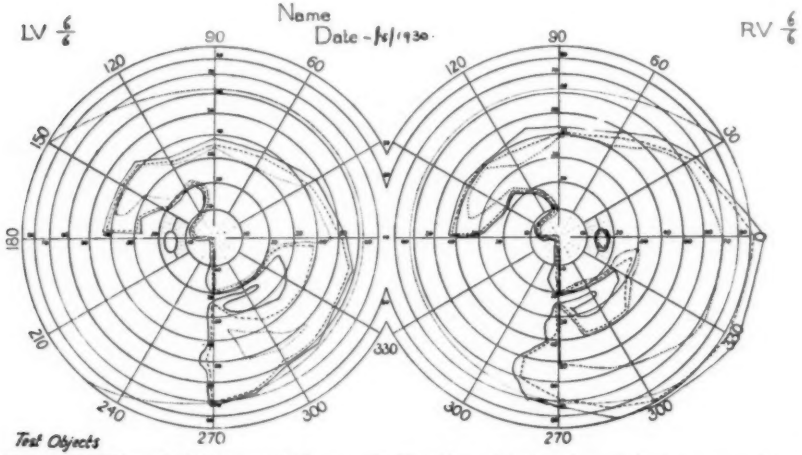


FIGURE XXIII.[1] Occipital meningioma. Fields taken shortly after patient's return from Boston, showing early loss of right half of each lower field due to pressure on the left visual cortex. In Figures XXIV to XXVI a gradual extension of this loss will be observed and the production of a ring scotoma. During this extension the remnant of the right field was little affected till near the end.

SUPRACHIASMAL LESIONS.

Space will not permit of a description of the course taken by the visual fibres as they form the tracts, enter the external geniculate body, and then, as the optic radiation, make their way to end in the cortex along the calcarine fissure.

It must be pointed out that the grouping of the fibres above the chiasma is according to a different plan. Just as in the optic nerve fibres from adjacent points of the retina lie together, so in each tract

[1] Figures XXIII to XXVI are fields of a patient with bilateral occipital meningioma. The chief features in his history were headaches, "bilious" attacks associated with left hemianopia during the preceding sixteen years, and recently failing vision from papilloedema. Partial removal of tumour on right side by Harvey Cushing, Boston, was followed by extension through *falx cerebri* to left calcarine fissure. Death occurred eighteen months later. Figures XXVII to XXIX are of the same patient.

fibres from corresponding points in the homolateral half of each retina come together. This fact explains the development of hemianopia in tract lesions. As this reshuffling is gradual, there is greater dissimilarity or incongruity between the two half fields in lower tract lesions than in upper tract lesions. The closer the lesion is to the chiasma, the greater is the possibility of a successive and incongruous hemianopia developing.

This pairing of fibres becomes complete except for those crossed fibres from the nasal periphery, which have no corresponding uncrossed fibres from the temporal retina. If these fibres are affected alone, there will be a partial loss of the temporal field, or if they are the only survivors in a post-chiasmal lesion, then there will be a peripheral

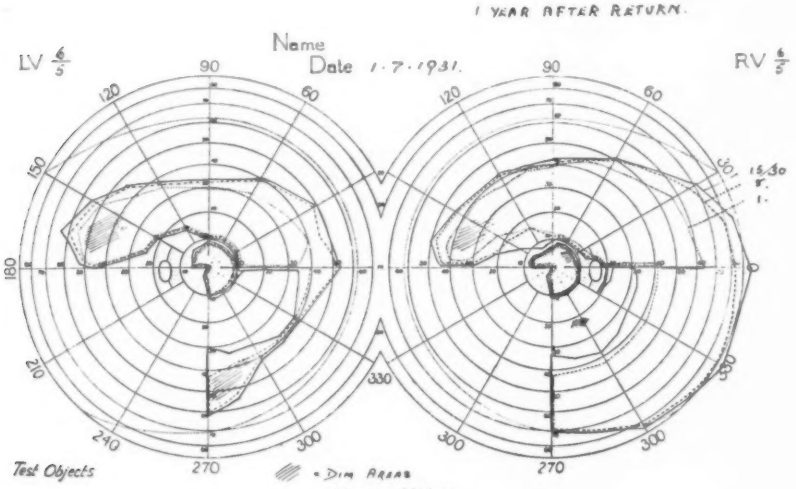


FIGURE XXIV.

crescentic area of retained vision. It is considered that these fibres terminate in the most anterior part of the visual cortex.

Between the chiasma and the internal capsule inclusively, the visual fibres are associated with other nerve tracts and centres, and their involvement aids in the localization of a lesion affecting these fibres. Above and below these levels the visual fibres are much less closely associated with such structures. The absence of such concomitant signs in supracapsular lesions adds to the importance of perimetry as an aid to their early recognition.

Homonymous hemianopia may be congruous or incongruous, simultaneous or successive, progressive or stationary, permanent or temporary, partial or complete, and relative or absolute.

Tract hemianopia is typically incongruous, relative, incomplete and progressive, and it often shows a vertical dividing line. Only in its

final stage, when one tract is completely blocked, is it complete and absolute. A partial hemianopia, when due to a supragenicular lesion, is practically always similar in extent and intensity, because there is more complete grouping of fibres from corresponding retinal points.

SUPRAGENICULATE LESIONS.

The visual fibres leave the external geniculate body and enter the retrolenticular part of the posterior limb of the internal capsule, lying behind the sensory and internal to the auditory fibres. They then run round the lateral wall of the posterior horn of the lateral ventricle,

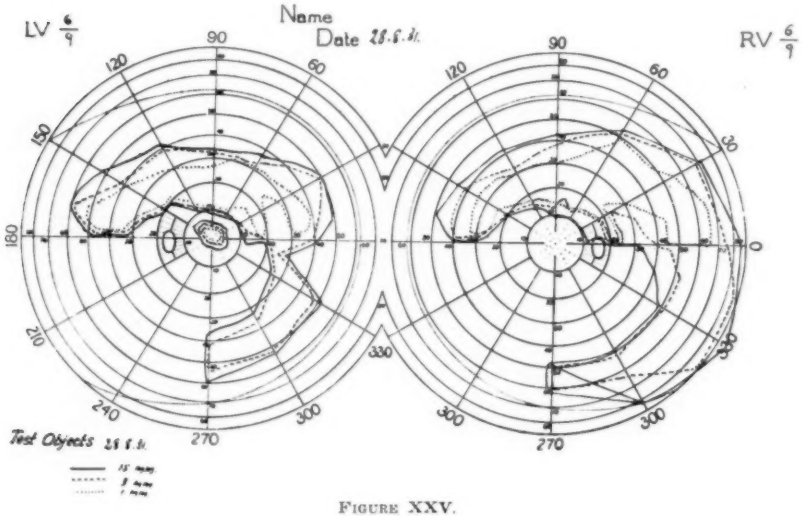


FIGURE XXV.

and, opposite the second temporal convolution, turn posteriorly to run toward the occipital pole. The dorsal fibres run direct, but the ventral bundle takes a longer course and therefore is the most vulnerable part of the radiation. After leaving the internal capsule, they turn downwards, outwards, and forwards in the direction of the temporal pole; then they turn sharply round the anterior horn of the lateral ventricle, forming the temporal knee of the radiation, and then they run backwards close to the floor and the inferior lateral wall of the ventricle, to the anterior part of the inferior calcarine cortex. The most anterior point reached in this detour brings these fibres close to the posterior margin of the chiasma. A lesion of the ventral fibres would lead to a superior quadrantic ipsolateral homonymous loss.

The macula may be spared by a lesion below the geniculate body; it is seldom involved if the lesion is above this level, and its escape is

the rule in cortical hemianopia. Usually a larger area is spared in suprageniculate than in lower lesions.

An homonymous hemianopia, whether partial or complete, is always congruous and simultaneous when due to a lesion in or between the external geniculate body and the cortex. It is "a single defect of the binocular field" (Traquair).

A sudden hemianopia, whether complete or incomplete, can be assumed to be suprageniculate, unless there is evidence to the contrary. A sudden and rapidly developing homonymous defect, especially if only transient, may be due to disseminated sclerosis. A gradual onset and a progressive course suggest a tumour or abscess, and a sudden onset

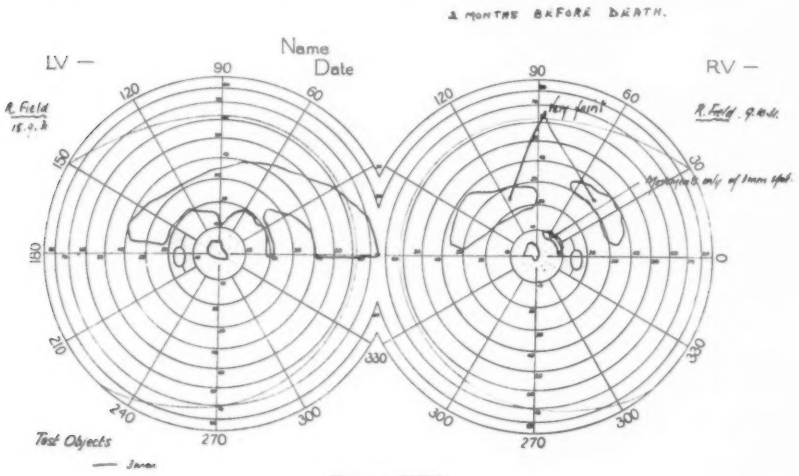


FIGURE XXVI.

with possibly some improvement later suggests a vascular lesion as the cause of the hemianopia. A vascular lesion, of course, may be due to a tumour and the consequent field defect may be the first sign revealing its presence. A hemianopia of sudden onset certainly does not exclude a neoplasm. The importance of this point is increased by the finding of Price that "the brain is actually the most common seat of new growth among all the individual organs of the body". A tumour, also, by pressure on a vessel, may lead to degeneration of remote tissues supplied by it, and so unexpected signs may appear causing confusion in diagnosis.

Though Kolodny found field changes in only 18·5% of a series of 38 temporal lobe tumours, Cushing found them more frequently. It must be remembered that quite a large part of the temporal lobe does not contain any visual fibres. Cushing considers that the defects due to temporal lobe tumours are due to radiation interference. Traquair holds that they are typically tract defects, showing early the character-

istic partial, incongruous hemianopia with a sloping edge, or possibly a central loss with a normal periphery. Later a complete hemianopia develops with division of the fixation area. In other words, these defects have the characteristics of a bitemporal hemianopia, due to a chiasmal lesion. The significance of the incongruity is uncertain. Ferree and Rand have proved that the nasal retina is more responsive to stimuli than

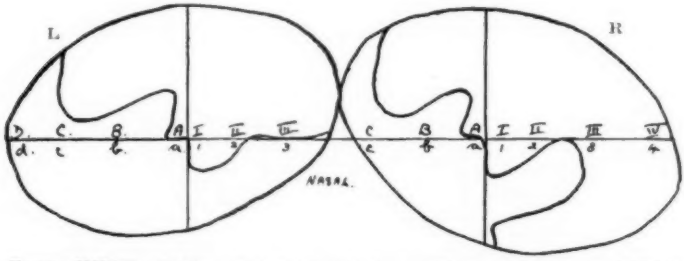


FIGURE XXVII. Fields. Occipital meningioma. Figures XXVII and XXVIII are representation of fields and occipital poles to aid in the interpretation of the fields XXIII to XXVI and in localization of lesion. Note early loss along upper lip and centre of lower lip of right calcarine fissure and spread to centre of upper lip of left calcarine fissure, with prolonged integrity of extremities of right and left lower lips.

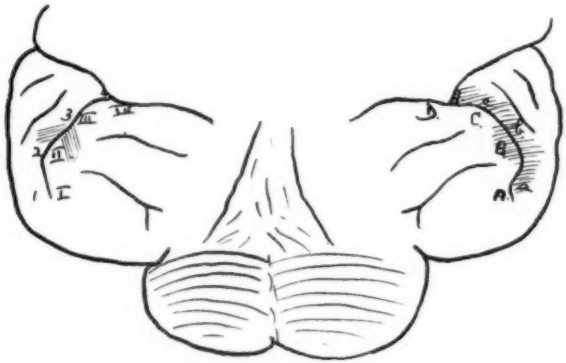


FIGURE XXVIII.

the temporal, that is, that the temporal field is more sensitive than the nasal field. As in Cushing's series the incongruity consisted mainly in a greater loss of the homolateral, that is, the nasal field, it is probable that such asymmetry is due to the difference in retinal sensitivity (229) and not necessarily to pressure downwards on the tract. Lack of symmetry may also be due to pressure downwards on the chiasma or optic tract or to the influence of papillœdema.

The optic radiation is so spread out round the outer wall and the floor of the lateral ventricle that a quadrantic loss is possible. The

importance of an homonymous quadrantic defect has recently been stressed by Cairns, who wrote: "There is no other sign so valuable in the diagnosis of temporo-sphenoidal abscess". Cairns urged the importance of repeated daily perimetry not only after mastoidectomy "but also after mild attacks of mastoiditis and frontal sinusitis that go untreated". Even though the advice given by Cairns cannot always be taken, yet it is felt that many cerebral abscesses would not escape recognition, or at least would be detected earlier, if such a suggestion were put into practice. The neglect of ophthalmoscopy and perimetry was a main reason why the tradition grew up amongst the pathologists at the London

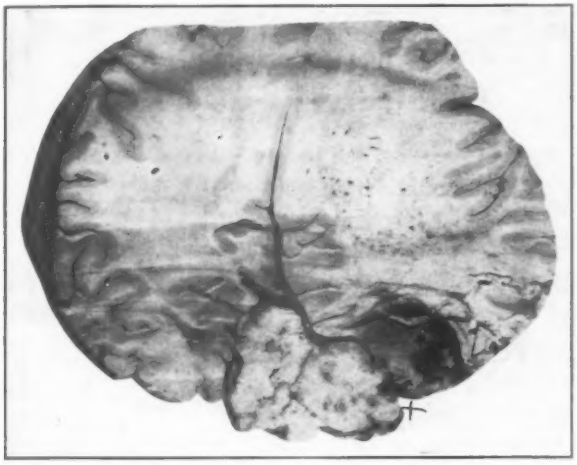


FIGURE XXIX. Showing photograph of tumour from patient whose fields are shown in Figures XXIII to XXVI. X marks displaced posterior extremity of *falx cerebri*.

Hospital that "cases sent down with the clinical diagnosis of cerebral thrombosis usually turned out to be cases of brain abscess" (Cairns). The finding of a quadrantic loss is of localizing value, and it may aid in the choice of an operation site. An inferior homonymous quadrantic defect indicates clearly that the lesion is high, and that it is useless to attempt to drain the abscess through the mastoidectomy wound (Cairns). Once found, the quadrantic loss should be carefully watched, for signs of progress demand immediate treatment. Just as papillœdema is of value in the recognition and treatment of serous meningitis, or of a muco-purulent inflammation of the meninges and cortex after aural infection, or of other pseudo-brain abscesses, so perimetry is of the greatest value as a means of finding a temporo-sphenoidal abscess and the site for its exposure (Figures XIX to XXII).

CORTICAL LESIONS.

"Hemianopia, as an isolated symptom, is so rarely due to a lesion of the optic radiation, and so frequently to one of the occipital cortex, or rather of the cortex *plus* the subcortical white matter, that the lesion may be supposed to be in the latter position, unless there is some evidence, such as a wound, to indicate the former" (Traquair).

The optical radiation ends along the calcarine fissure. The conclusions of Holmes regarding the visual cortex, though not final, are based on much exact work. He considers that the upper half of each retina is represented in the dorsal and the lower half in the ventral

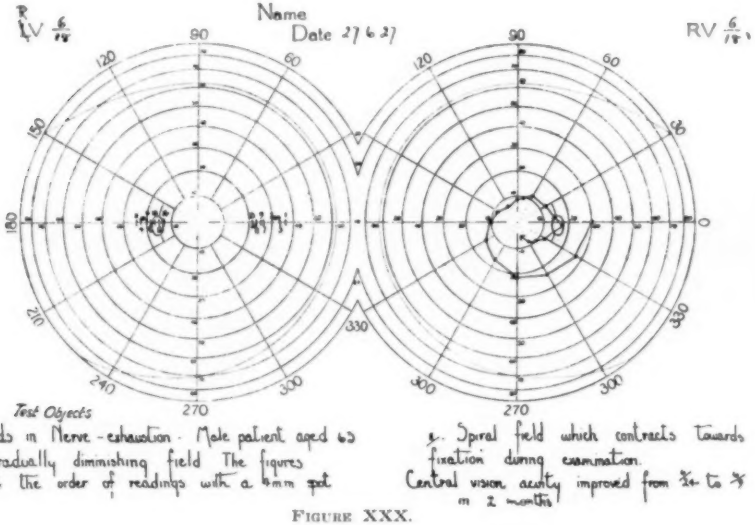


FIGURE XXX.

part of each visual area, and that the centre of the visual field is projected from the more posterior part of this area, while the periphery is subserved by the anterior portion. The crossed fibres from the nasal periphery of the retina which correspond with the unpaired part of the temporal field, probably terminate in the most anterior part of the visual area. Holmes considers further that the field in the nieghbourhood of its horizontal axis is represented along the floor of the calcarine fissure, and that the portions closest to the vertical axis correspond to the superficial part of the visual cortex (Figures XXIII to XXVI and XXVIII).

It is important to note that the macular cortical area receives a special blood supply from the anastomosing branches of two separate arterial systems, the posterior and middle cerebral. The recognition of a bruit on visual concentration only, in an angioma in this area, is of

great interest (Fulton). In a patient with a circumscribed angioma arterial racemosum of the left occipital visual cortex, a well marked auscultatory bruit was heard; it lessened when the patient's eyes were closed, and increased markedly when he attempted to read. No increase in systolic pressure occurred, and the bruit was not affected by other stimulation, such as attempting to hear a watch or to smell.

Though no form of field defect is pathognomonic of a cortical lesion, yet if in an otherwise normal field a central hemianopic scotoma suddenly appears without other symptoms, then the lesion is most probably cortical or subcortical. A central hemianopic scotoma, however,

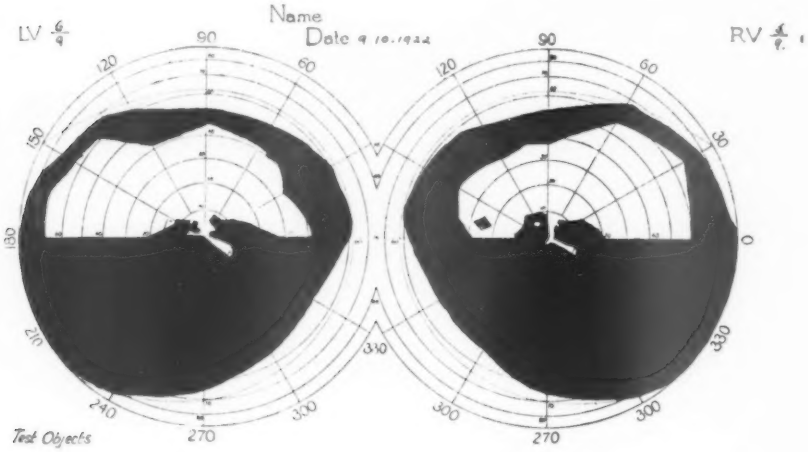


FIGURE XXXI.

if associated with an homonymous hemianopia with tract characteristics, helps to exclude a suprageniculate lesion, for such an association is extremely rare. Hemianopic scotomata may develop in any part of the field, but those in the periphery are missed except by careful perimetry. Very small isolated non-progressive defects of this type are more likely to be produced by lesions in the cortex than elsewhere, because the suprachiasmal tract is most spread out there (Traquair).

Little difficulty is found in distinguishing such field defects from those which are influenced by the presence of nerve exhaustion (Figure XXX).

Much of our knowledge of the field defects due to cortical lesions is due to the careful work of Gordon Holmes and others during the war. The lower visual fields were the most commonly affected, as

trauma producing loss of the upper fields would mean injury to the lower visual area, and almost certain death from injury to the neighbouring blood sinuses. The macula which is usually spared in civil cortical lesions was not spared so frequently during the war, for the safeguard of a double blood supply is of little avail in insuring integrity against the destruction wrought by fragments of shell (Figure XXXI).

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Surgical Technique.

IMMOBILIZATION OF RECENT FRACTURES OF THE EXTREMITIES IN UNPADDED PLASTER CASTS.

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Melbourne.

An innovation in the modern treatment of fractures is their immediate immobilization, after reduction, in unpadded plaster casts. Such casts were first used many years ago. However, when such disasters as losses of limbs were reported after application of unpadded casts, they were soon discarded in favour of well padded casts.

The following objections have been advanced against the use of plaster of Paris casts, whether padded or unpadded (especially against unpadded casts), for splinting recent fractures:

1. The good position of the fragments, obtained after reduction, cannot be maintained during the application of the cast.
2. A cast may temporarily retain the bones in good position, but when swelling subsides, the deformity recurs under the cast (especially when thickly padded). As a result an area of skin, subcutaneous tissue and muscle is compressed between the displaced bone ends and the inner surface of the cast. A cutaneous pressure sore is produced and, if further necrosis develops, the bone ends may project through the skin. A simple closed fracture in these circumstances becomes open and infected.
3. Vascular obstruction and pressure sores cannot be avoided.
4. Muscle wasting, bone decalcification and extra-articular ankylosis of immobilized joints are inevitable.

A technique which avoids all these errors has been perfected during the last six years, after much experience by Lorenz Böhler and his co-workers at the Accident Insurance Hospital in Vienna. This method is now placed on a sound basis and is described by Fritz Schnek, first assistant to Böhler, in his book, "The Technique of the Non-padded Plaster Cast".

The object of this paper is to describe, with practical illustrations, the principles underlying the immediate immobilization in various unpadded casts of fractures of the upper and lower limbs; and also to give a brief description of practical details.

Principles in Treatment of Recent Fractures.

The following principles are recognized in the treatment of recent fractures: (i) reduction of the deformity, (ii) uninterrupted immobilization of the fracture, (iii) functional treatment.

Reduction of the Deformity.

The displaced bone ends cause pressure on the surrounding muscles and blood vessels, and thereby effect major or minor degrees of circulatory disturbance, which may become progressive. Good reduction of all deformities is therefore essential before a cast is applied. Modern treatment aims at very exact replace-

ment of the broken bone fragments by non-operative measures. An important aid is immediate control by X ray examination (Figure XI). Sometimes skeletal traction is required, but only when the alternative is open operation or the attainment of a poor result by conservative measures.

Uninterrupted Immobilization of the Fracture.

Such authorities as the late Sir Robert Jones and Böhler stress the necessity of immobilization for a much longer period than is usually prescribed in text books. For example, fracture of the carpal scaphoid should be treated in a light cast for six weeks to six months (Figures XXII and XXIII); fracture of compact bone, such as that of the middle of the shaft of the humerus or radius, quite often requires immobilization for four to six months before sound healing occurs. All casts allow ambulatory treatment; hence lengthy immobilization is compatible with useful activity. Incomplete or too short a period of immobilization of the fracture in a cast greatly prolongs the period of incapacity for two reasons: first, because delayed or non-union is not uncommon; secondly, because persistent traumatic trophœdema develops and causes slow functional recovery.

The clinical features of traumatic œdema are chronic swelling of the limb in the region of and distal to the fracture, pain, swelling, atrophy of muscles, stiffness of joints and acute bone atrophy. Swelling is caused by œdema, resulting from the transudation of tissue fluids, which occurs when traumatized bone and soft parts (particularly the soft parts) are subjected to movement before sound healing has occurred. "Traumatic œdema" is a troublesome condition. It also occurs in the absence of fracture. In traumatic œdema tissue fluids saturate the capsule, ligaments, areolar tissues and muscles in the region of the fracture or injury. The œdema then causes venous obstruction and congestion; the resultant hyperæmia determines decalcification of bone and digestion of supporting structures, such as muscles and ligaments. The affected parts are indistinguishable from chronic or granulation tissue. Such tissues eventually become organized and then produce hypertrophy of the connective structures resulting in stiffness of muscles and extra-articular ankylosis.

A splint always at hand and ready to fulfil the principle of absolute immobilization of the fracture and of the injured soft parts is the unpadded plaster cast.

Functional Treatment.

Functional treatment consists of immobilization of the fracture *plus* active movements of the affected limb. After correct reduction of the fracture, the affected parts are immobilized in a light, perfectly fitting, unpadded plaster cast. Movements of the limbs then bring about muscle contractions. Such muscular activity causes rapid diminution (in twelve to twenty-four hours) of the swelling through the increased venous return and milking effect on the hæmatoma and traumatic exudate in the contused and lacerated tissues. After a few days a new cast is sometimes necessary. The muscles running over immobilized joints tug on their attachments to joint ligaments and capsule, thereby minimizing the development of ankylosis. When splints are removed prematurely, especially when functional treatment has not been carried out, persistent pain and swelling are crippling sequelæ. For example, if a patient with a Pott's fracture has not walked in his cast, and if the cast is discarded too early, one can surely anticipate a disabling painful, swollen and stiff ankle *plus* a traumatic flat foot. In some cases in which the ligaments are extensively damaged (such as the lower tibio-fibular interosseous ligament), abduction and lateral displacement of the foot may occur weeks after the accident. Patients with trophœdema are frequently lost for some months in the massage department, are still lame and continue to draw accident insurance. If the affected limb of such a patient, even at this late stage, is immobilized in a walking cast and iron (Figure IX), or in a firm Unna's paste or elastoplast bandage, immediate relief is obtained. Active painless movements are soon performed and crutches are soon thrown away. On removal of the cast at the end of six weeks, swelling is no longer present, whilst the range of movement at the

ankle is much greater than it was before immobilization by the belated cast. Where ankylosis was formerly present, there is now good function. The improvement was not obtained by physiotherapeutic measures, but by active movements of the limb, whilst the injured parts were immobilized in a cast, that is by "functional treatment". Stiffness and muscle wasting, disabilities held against the plaster cast, can not only be avoided, but actually cured thereby.

TECHNIQUE FOR APPLICATION OF UNPADDED PLASTER CASTS.

The technique for application of unpadded plaster casts for various fractures is considered under the following headings:

1. The plaster of Paris bandage.
2. General principles in cast construction:
   - (*a*) Making the plaster splint.
   - (*b*) Application and fixation of the splint to the limbs.
   - (*c*) Trimming and finishing.
3. Casts for the lower extremity:
   - (*a*) Indications for the use of simple casts.
   - (*b*) Indications for incorporating skeletal traction in casts.
   - (*c*) Position of the limb to maintain the reduction during application of the cast.
   - (*d*) Features of special casts.
   - (*e*) Special features of casts incorporating skeletal traction.
   - (*f*) Weight bearing in walking casts.
4. Casts for the upper extremity:
   - (*a*) Indications for the use of simple casts.
   - (*b*) Indications for incorporating skeletal traction in casts.
   - (*c*) Position of the limb to maintain the reduction during application of the cast.
   - (*d*) Features of special casts.
   - (*e*) Special features of casts incorporating skeletal traction.
5. Control of fractures in unpadded casts.
6. Precautions.
7. Advantages.

1. The Plaster of Paris Bandage.

Unless good plaster of Paris bandages are used, it is impossible to construct a correct cast which will hold the fractured bones in good position, allow functional treatment and avoid all the errors held against plaster casts. The first essential is that the cast should "set", that is harden, within a few minutes of its completion. Bandages which take too long to harden allow redisplacements to occur. The latest commercial bandages are impregnated with a chemical substance to accelerate hardening, and therefore creases and ridges are almost certain to form and then set so quickly that proper moulding is almost impossible. This does not apply to small casts, such as are demanded by a wrist injury. In the last-mentioned type of bandage, parts of the cast harden before other parts have been either placed in position or finished; this weakens the cast, which is laminated.

"Setting" is a chemical action in which the calcined gypsum recrystallizes on being mixed with water. It should occur within three to eight minutes, depending upon the amount of moisture remaining after the bandage is wrung. Unsuitable plaster may not "set" but only dry like a mud pie, taking many hours to harden (four to twenty-four). During all that time pressure ridges are liable to occur owing to bending of the soft cast; pressure points are caused by resting the cast on hard objects and finally recurrence of the deformity is likely to result. If plaster of Paris bandages are made according to the following directions, they will be found to be superior to any commercial bandage as regards control of "setting" time, moulding, and absence of contraction on drying.

The plaster is dried at a temperature of 55·5° C. (130° F.) in an oven (in which it should always be kept) for at least twenty-four hours. King's

Windsor Dental F.F.F. plaster of Paris is used. The carrying material for the plaster is a meshed gauze having twenty-seven strands to the inch each way. It contains a minimum of size or stiffening dressing of starch or glue; any excess of this dressing not only retards setting, but also produces contraction on drying, causing constriction of the limb. Strips of gauze six and a quarter inches by three yards (the material is sold in twelve yard lengths) are torn by hand, but the beginning of each tear is preceded by carefully cutting between two strands for three inches with a scissors. Four threads are now plucked from each edge in order to avoid their stripping off and becoming entangled in the wet bandage. The warm plaster is rubbed into the gauze strips (Figure I) with the smooth surface of gloved hands (the gauze will not "take" the plaster if rough gloves are used). The rubbed gauze is rolled up moderately firmly on a one-half inch rod, which is later withdrawn (Figure I). A correctly rubbed bandage contains sufficient plaster to make it weigh just over eight ounces and, if correctly rolled, is just about two inches in diameter. Bandages, though superior if freshly made, may be stored in the warm oven; and, if removed from the oven, may be kept in tins sealed with adhesive tape.

FIGURE I. Making a plaster of Paris bandage by rubbing in eight ounces of warm plaster into a fine meshed gauze six and a quarter inches wide (four threads are torn from each border) and three yards long. This width and length of bandage are standardized and are the only sizes used for all splints. One such bandage is sufficient to make a splint for the wrist; two are required for leg splints.

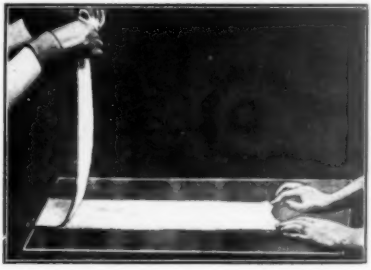


FIGURE II. A splint is made from six to eight layers of the moistened standard plaster of Paris bandage, rolled out on a glass-topped table. Note that twice the required length of bandage for the splint is unrolled. The extra length is then thrown back to the assistant in a smooth manœuvre. To make a three inch wide splint, only three layers of the six inch bandage are rolled into a splint. Then this splint is folded over along its length, thereby creating a six layered splint, which is three inches wide (see Figure IV). The splint, "slab", longuette or "atelle" (Calot) method of cast construction is the basis of all casts. It is an old method (Stimson).

2. General Principles in Cast Construction.

(a) Making the Plaster Splint.

The bandage is carefully handled and slid obliquely into a basin, the inner surface of which is smeared with vaseline. The basin holds warm water at a temperature of 55·5° C. (130° F.), and the water should contain no salt or other chemical substance which hastens setting but weakens the cast. The bandage should lie on its side and not be placed vertically. When all bubbles cease (one to two minutes), the bandage is removed by holding the two ends between the thumb and index finger of either hand. The two ends are closed by tight pinching, so that little plaster is lost during the wringing (a half twist is usually sufficient). The speed in setting of such a plaster bandage depends upon the amount of moisture remaining. Beginners are advised not to wring out the bandage at all,

in order that they may have the full eight minutes for careful moulding of the splints.

The bandage is now unrolled backwards and forwards on a glass-topped table or piece of polished aluminium sheeting. If aluminium sheeting is used, three inches of one end should be bent over the table edge; this will prevent the sheet slipping when the splint is slid off later from the other end. It is usual to unroll twice the required length of bandage and to throw back the extra length to the starting point as in the illustration (Figure II). When six

FIGURE III. Position for reducing deformities, maintaining good reduction and application of the cast for fractures of the leg and ankle. The tendon of Achilles is thereby relaxed. Even though the case demands a cast extending higher, this position and the application of a below-knee cast are always the preliminary stages (except for tibial and femoral articular fractures which demand full extension of the knee in order to restore the articular surfaces). Note the felt strip around the tibial tuberosity; it also protects the common peroneal nerve.

FIGURE IV. The "U" strip is applied. It is moulded very carefully over the malleoli, which it holds in the reduced position, when hard. This "U" strip enables an equally strong and much lighter cast to be made than is possible when the single posterior splint is used and reinforced with layers of circular plaster bandages.

to eight layers have been made, they are well rubbed together with the palmar surface of the hand. The splint is now slid off the table by pulling it from one end. It should not be lifted off, as such a procedure removes plaster from the layers of the splint next to the glass or aluminium.

(b) Application and Fixation of the Splint to the Limb.

The non-encircling splint placed on the unpadded and unoiled skin in the long axis of the limb is the basis of all casts. Whilst padding is practically not used, it is necessary in the following situations:

The Upper Extremity.

(i) A pad of gauze bandage or, better, a piece of felt strip one-eighth of an inch in thickness is stuck with mastic gum to the skin at the upper margin

of forearm and arm casts (Figure III) in order to prevent the upper margin from cutting into the skin.

(ii) A felt strip one-half inch by three inches is stuck to the skin just behind the knuckles (only in special cases, as nerve paralyses).

The Lower Extremity.

(i) A similar pad is placed around the upper margin of all leg casts (Figure III).

(ii) A felt strip one half inch by three inches is stuck to the skin just above the toe clefts (only when trophic changes are present).

(iii) The ischial tuberosity in high thigh casts (Figure X) or in large Whitman casts is protected and clearly outlined by a long rolled pad, to the ends

FIGURE V. The next stage is the application of a posterior six inch splint (to beyond the toes), which overlaps the "U" splint. It is split on each side from the malleoli to the point of the heel. It is bound on with a gauze bandage.

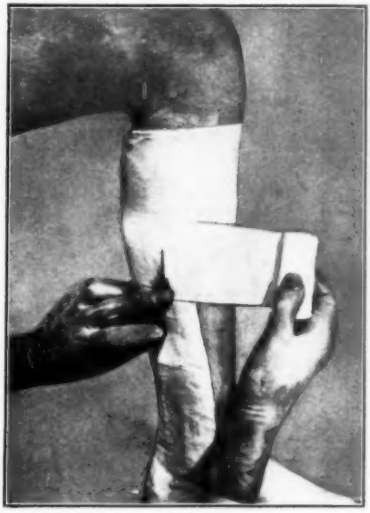


FIGURE VI. Splints are snugly bound on neatly and with lightly drawn gauze bandages, which are pleated (preferable to reversing) over the splint and not on the skin.

of which a tape is sewn. The cast is carefully built up around the clearly indicated ischial tuberosity.

(iv) The pelvic prominences in a Whitman cast are individually protected by pads stuck on with mastic gum; that is, the iliac spines and crests, the pubis and the sacrum. The pads are then covered by circular gauze fixation bandages.

The splint should be smoothly and systematically rubbed with the closed fingers and palms until there is firm adherence to the skin and hairs (the hairs, being shed after three weeks, do not cause discomfort on removal of the cast later). The splint is bound on with three or four inch, wide meshed, gauze bandages, which insure circular moulding. One to two loose, but well rubbed in, circular turns of plaster bandage complete the cast. Each turn of the bandage is smoothed, otherwise a laminated and weak cast is produced, whilst emphysematous areas prevent good X ray pictures being taken through the plaster cast. Casts are not split or bivalved (see precautions later).

(c) Trimming and Finishing.

The proximal margin of all casts should not project above the felt strip (Figures V, VI, XVIII and XXI).

The lower margin must be standardized as follows:

Upper Extremity.—The lower edge of all splints on the dorsum always terminates in the same way, whether for arm, forearm, wrist or hand. This edge extends to the knuckles of the second to the fourth fingers. This effect is obtained with careful shortening by trimming a splint made at first slightly too long. If the splint remains extended beyond the knuckles, stiff fingers result, because finger movements are not performed. If the splint finishes proximal to the knuckles, œdema of the back of the hand is certain to occur, and the lower edge causes skin necrosis. The whole of the thumb metacarpal must be left entirely free (Figure XXI, XXII and XXIII) if free movements of the thumb are to be carried out. Neglect of this precaution is followed by adherence of the tendon sheaths of the thumb, by stiffness of the joints and by decalcification of the lower end of the radius, scaphoid (in fracture of which union may not then occur) and long bones of the thumbs. These free thumb movements do not allow any movements of the radial carpal bones, such as a fractured scaphoid.

FIGURE VII. The illustration shows a cast viewed from the sole and inner aspect of the right foot. By inverting the front of the heel (B) and everting the forefoot (A) until the cast hardens, the normal longitudinal arch is restored and traumatic flat foot is avoided. The foot, furthermore, should be at right angles to the leg and neither adducted nor abducted. In Pott's fracture, manipulative adduction and inversion (often recommended) does not occur at the tarsal joints, but at the injured ankle joint, thereby causing lateral displacement of the astragalus (Talus). In the case of a weak or flat foot which has developed, a plaster boot, if twisted as directed above, and held until the plaster hardens, gives a negative cast of a corrected foot. A positive mould is then made and an arch support made which exactly corrects the flat foot.

FIGURE VIII. The walking iron is placed exactly in the long axis of the limb, otherwise the patient walks with anterior or recurvation strain on the knee; also the lower curved end of the iron is placed at a distance below the sole corresponding with the height of the opposite heel. If the distance is too great, the patient walks with a flexed knee; whilst if too short, the end of the cast under the sole and toe scrapes on the ground and eventually breaks off.

Lower Extremity.—The lower edge of leg casts must extend on the sole to just beyond the ends of the toes, toe contractures when walking being thus avoided

(Figure IX). The upper surface of the foot corresponds to the back of the hand, and so the cast extends just to the toe clefts. Otherwise similar disturbances result (that is, swelling on the back of the foot, with cutting of the skin by the lower edge).

A smooth finish to the cast prolongs its life and is obtained by maintaining circular rubbing whilst the cast is hardening. With indelible pencil the cast is marked with the date of the accident, below that the date of reduction, and below that the date of anticipated removal. Finally a drawing of the skiagram is made on the cast showing the position of the fragments after reduction (Figures IX and XIV). This information is valuable not only to the surgeon, but also to the insurance medical referee, especially if the surgeon puts his initials on the cast.

FIGURE IX. The well-known Böhler walking cast and iron. Note how the splint on the sole extends beyond the toes, thereby preventing toe contractures. On the upper aspect the cast terminates at the toe clefts. The dates of the accident, below that of the reduction and below that of the anticipated removal, are drawn with indelible pencil; also the drawing of the X ray picture after reduction. In severe Pott's fractures, all oblique and most transverse fractures of both leg bones, the cast is extended up to the mid-thigh or ischial tuberosity (see text).

3. Casts for the Lower Extremity.

(a) Indications for the Use of Simple Casts.

Fractures of the Femur.

Casts are not used for fractures of the shaft of the femur; in most cases they require traction on a splint.

Subcapital, Intracapsular or Adduction Fractures.—Böhler is a strong advocate of the rustless three-flanged nail and impacting operation of Smith-Peterson, which he considers in selected cases is safer and more certain than the large uncomfortable Whitman cast. Patients who have been operated on are placed for the first three weeks after operation on a cradle splint in which slight traction is maintained. After this period a short pelvic plaster cast extends to just above the knee, allowing walking in about six weeks after the operation. This short plaster breeches cast is also used for the impacted cases (abduction fractures).

Trochanteric Fractures. — Trochanteric fractures are preferably treated with ten weeks' traction on a splint, as the large Whitman cast results in a very stiff knee and wasting of the quadriceps muscle. This avoidable disablement occurs also in children. It is troublesome and adds to the expense and time of treatment.

Fractures of the Femoral Condyles.—Fractures of the femoral condyles are reduced by extending the limb (in the screw traction apparatus, if necessary; see Figure XV), and then applying a cast from the toes to the ischial tuberosity.

Fractures of the Tibia and Fibula.

Tibial Condyles.—The same treatment as for femoral condyles is carried out in fractures of the tibial condyles.

Shaft Fractures.—As a general routine, a cast is not immediately applied in shaft fractures of the tibia and fibula, because in most cases there is too much

swelling due to the muscle injury and rupture of blood vessels. Therefore, the limb is placed on a Braun splint, with adequate traction on the lower fragment, for a period of three weeks. The foot of the bed should be raised 25 centimetres (ten inches) to facilitate gravitational removal of the hæmatoma and exudate. The extent to which the cast reaches proximally depends upon the site of the fracture and the type (that is, transverse, oblique or comminuted and splintered) as follows:

Transverse fractures in the lowest third require casts below the knee, but as angulation in the antero-posterior direction occurs notoriously in these cases from *tendo Achillis* pull, they must be carefully controlled during the ambulatory period by X ray examination every ten to fourteen days. Transverse fractures in the upper two-thirds of the leg require a cast extending to the middle of the thigh.

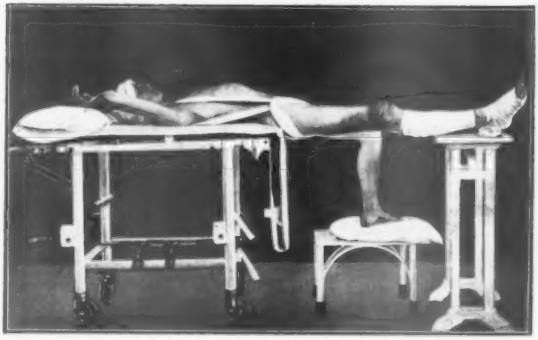


FIGURE X. Position for extending a "below-knee cast" to the ischial tuberosity, which is outlined by the roller pad. The cast is carefully built up around the latter, which then resembles the padded ring of a Thomas splint. The actual case illustrated is an operated fracture of the patella. The cast will extend distally only to above the ankle. Swelling of the ankle and foot distal to such a cast is prevented by applying an Unna's paste cast to the toe cleft, as illustrated. A strip of felt demarcates, just above the ankle, the lower edge of the plaster cast.

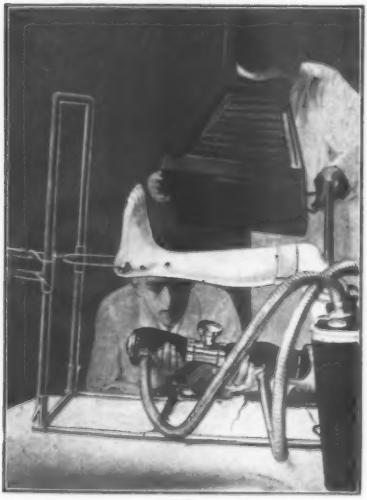


FIGURE XI. Böhler's screw traction apparatus for reduction of difficult fractures of the lower extremity. The case illustrated is an oblique and splintered fracture of the tibial and fibular shafts. Note the pins through the upper and lower ends of the tibia. X ray control is by a shock-proof unit. The fluoroscopic screen is useful for shaft fractures, but films are used to control ankle fractures, which require greater accuracy in reduction.

Oblique and especially comminuted fractures in the lowest third require a cast extending at least to the middle of the thigh, whilst with a fracture in the upper two-thirds the cast should extend to the ischial tuberosity.

Ankle Fractures.

Casts extend proximally as follows:

Simple Pott's fractures with slight or no displacement require casts below the knee.

For considerable lateral displacement, especially if there is anterior or posterior displacement due to avulsion of the anterior or posterior lower articular margins respectively, the cast should extend to the middle of the thigh. When the inner malleolus is also fractured, a similar cast is used.

For third degree Pott's fracture in which the anterior or posterior articular surface of the tibia ("third malleolus")

is split off by a vertical or oblique crack, a cast is not applied immediately as a rule. After two to six weeks of traction a mid-thigh cast is applied. If the cast is immediately applied, the foot and attached tibial fragment slip upwards within the cast and then the foot is dislocated forward or backwards, depending upon whether the tibial fragment is anterior or posterior (see note, Figure XVII).

In fractures and dislocations of the foot bones, casts below the knee are used.

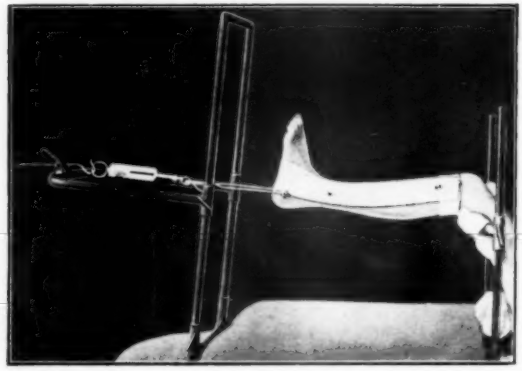


FIGURE XII. The "U" shaped splint is placed and extends proximally, to the felt strip. The ends of the pins are penetrating the plaster splint, which is aseptic on hardening. No other dressing is placed around the pin holes in the skin; forty to fifty pounds force is measured by the spring balance. Over-traction is to be avoided.

(b) Indications for Incorporating Skeletal Traction in Casts.

Tibia and Fibular Shaft Fractures.

Oblique or comminuted fractures, especialy combinations of the two, are suitable for the double pin method (Figures XI to XIV), which is applied after three to four weeks of traction in a cradle splint. As an alternative method to immobilization in a long cast (see indications for simple casts), it has the advantages that walking may be allowed much earlier, the knee joint is not immobilized and the reduction is both very accurately carried out and continuously maintained, without any possibility of redisplacements occurring when walking is allowed. The skilful application of the principles of this method renders nearly all open operative procedures unnecessary. Operations for fracture reduction, especially in the leg, are associated with an appalling percentage of bone infections. In order to expose the bone, it is necessary to cut through abnormal tissues, such as traumatized muscles, tissues and blood vessels. The processes of repair in such devitalized tissues are very slow, and their immunity to infection is very poor indeed. When a pin or wire is used, however, it passes through normal soft

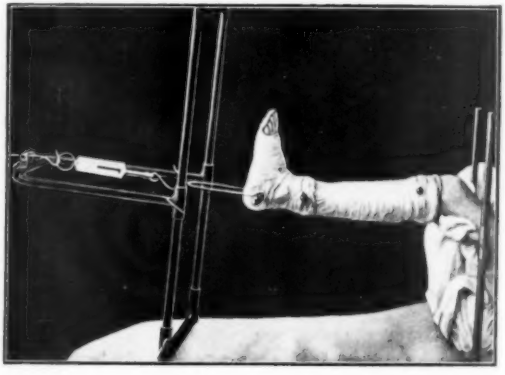


FIGURE XIII. A posterior splint extending beyond the toes and an anterior splint to the toe clefts have been applied, bound on by gauze bandaging and covered with one or two circular layers of plaster bandage. Note the collars over the pins, yet to be covered.

tissues and bone, and is therefore safe. In the Smith-Peterson impacting operation on the subcapital fractures of the hip, the danger from infection is slight, because there is no muscle or vascular injury, and is therefore not comparable to the operative dangers associated with other fractures, where so much soft tissue trauma from the projecting bone ends is usually a special feature.

Ankle Fractures.

Patients suffering from third degree Pott's fractures with involvement of the tibial articular surface may walk after about three weeks, only if pins through the *os calcis* and tibia are included in the cast (seldom ever advisable).

Fracture Dislocations of the Foot.

The commonest fracture dislocation of the foot is at the mid-tarsal joint or dislocation of the astragalus.

Fractures of the Tarsal and Metatarsal Bones.

Fractures of the tarsal and metatarsal bones suitable for treatment by plaster casts include the severely comminuted *os calcis* fractures and fractures of the metatarsal bones, especially when a number of them are affected. In these foot fracture dislocations the usual traction points are the metatarsal necks and the *os calcis*.

FIGURE XIV. Walking cast incorporating tibial pins. The case illustrated is the same, as shown in Figures XI, XII and XIII.

(c) Position of the Limb to Maintain Reduction During Application of the Cast.

Casts Below the Knee.—The patient sits or lies on the table, the sound foot resting on a stool (Figure III). The injured foot is at right angles to the leg, the head of the fifth metatarsal resting on the operator's knee, so that the forefoot is everted and not inverted, as commonly advised. But the foot is neither abducted nor adducted (see accompanying note to Figure VII).

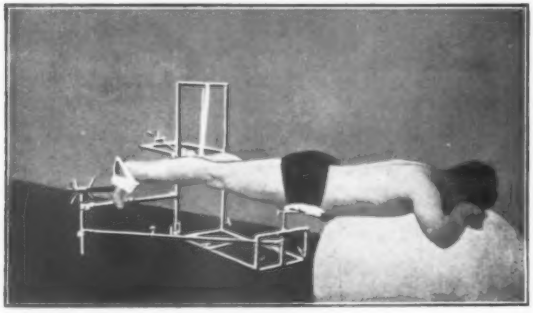


FIGURE XV. Böhler's screw traction apparatus for the lower extremity, fully extended for traction during hip operations or for applying casts with the extended knee in articular fracture of the femoral condyles or tibial tuberosities. Illustration shows prone position (suggested by Leo Doyle) for applying Whitman's abduction cast.

Leg and ankle fractures reduced in the screw traction apparatus are then in a below-knee cast and are subsequently built up to the middle of the thigh (when traction and

countertraction pins are not incorporated in the cast) or higher as in Figure X.

Mid-Thigh Casts and Those Extending to the Ischial Tuberosity.—Mid-thigh casts and those extending to the ischial tuberosity are built up on the basis of the below-knee cast, because the position used with the below-knee cast (Figure III) relaxes the *tendo Achillis* and permits reduction. Then the cast is extended with the leg and thigh in the position shown in Figure X.

Large Whitman Casts for Holding the Hip in the Abducted Position.—The application of large Whitman casts for holding the hip in the abducted position is easier in the prone position (Leo Doyle), as shown in Figure XV.

Fractures of the Femoral Condyles or Tibial Tuberosities.—Fractures of the femoral condyles or tibial tuberosities are reduced in full extension in order to restore normal articular surfaces, which is seldom possible in flexion.

(d) Features of Special Casts.

Casts Below the Knee.—In making casts for application below the knee, a "U" bandage (three inches in width), is made from a three-layered six inch splint folded over to constitute six layers, and applied to the side of the leg (Figure IV). It is bound on with gauze bandage, the turns of which are not reversed, but are pleated over the splint and not on the skin (Figure VI). The long posterior splint is now applied (Figure V) from below the popliteal fossa to beyond the toes. It should be long enough to be carried four inches beyond the toes. The superfluous length is then folded back on itself, so that beneath the toes the splint consists of twelve layers. Any redundant length of splint is now turned up over on the upper surface of the toes and anchors the splint, but is trimmed later. The splint is cut opposite each malleolus to the point of the heel, and the edges are carefully folded over (Figure V). This splint is bound on with gauze and is now covered with two layers of circular plaster bandages. The walking iron is fixed on when the cast is hard (Figure VIII).

The iron does not transmit weight above the fracture, but to all the moulded prominences and bearing surfaces, that is, the sole, the malleoli and the tibial condyles. The below-knee cast is the pre-

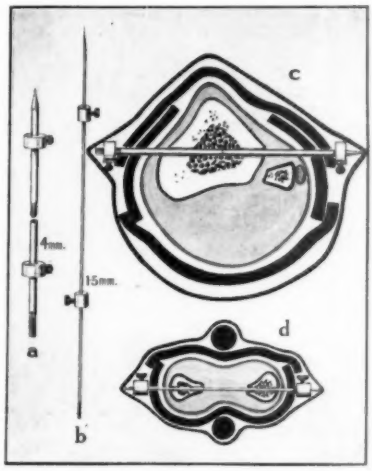


FIGURE XVI. All these drawings are exactly to scale. *a.* Rustless steel pin (four millimetres or three-sixteenths of an inch diameter, and four to six inches long) for transfixing the upper and lower ends of the tibia when the fractures of both bones of the leg are very oblique or comminuted. These pins may be unscrewed in the centre and thereby removed aseptically from the bone. The collars prevent movements of the pin in the cast. *b.* Kirschner rustless steel wire (1·5 millimetres or one-sixteenth of an inch diameter and ten inches long) and collars for incorporating in the cast. These wires are used for oblique and splintered fractures of both forearm bones, which otherwise displace after reduction and immobilization in an ordinary cast. *c.* Cross section of the upper end of the tibia and fibula, showing upper pin, incorporated in a plaster cast. A similar though shorter pin transfixes the lower end of the tibia. Note the "U" plaster splint, three inches wide on either side of the leg, the posterior splint and then the anterior splint, the collars on the pins and then the whole surrounded by two turns of circular plaster bandages. The pin should be inserted through the medullary cavity of the bone, which otherwise tends to fissure and split. Note the common peroneal nerve on the outer aspect of the fibula. *d.* Cross section of the lower forearm in a case of fracture of both bones, which are splintered and obliquely broken. Good reduction could not be maintained in a simple cast without incorporating the wires through the lower end of both bones and through the upper end of the ulna. Note the wide posterior splint, the narrow anterior splint, the wooden pegs impressing the splints in the interosseous space, the collars to fix the wires and the single layer of encircling plaster bandages.

liminary stage of all casts extending above the knee (except for articular fractures about the knee, which are put in long casts with the leg extended).

Elongating the Standard Leg Cast Above the Knee.—The external popliteal nerve (common peroneal nerve) is protected by the felt strip under the upper edge of the hard leg cast, which is now moistened so that four splints which are used to extend the cast will adhere well to it. Circular gauze fixation bandages are followed by the application of two layers of plaster bandages, which in the case of casts carefully built up around the padded ischial tuberosity, resemble the padded ring of the Thomas splint.

Whitman Abduction Plaster Cast.—The formidable cast known as the Whitman abduction cast is made in sections because the first completed parts harden before the latter parts are finished. The partially padded pelvis and trunk are surrounded by circular plaster bandages, which should extend above to the nipple line. A series of reinforcing splints are applied to the upper part and thereafter directly to the skin of the lower extremity as far as the toes. Walking is just possible in such a cast, if the walking iron is placed parallel to the normal leg and not in the long axis of the abducted limb. Instead of the transverse bars of the iron being on the sides of the leg, they fit on the front and back of the shin and the vertical bars are attached to the leg only for a few inches at the upper end, whilst the remainder is bent at 45° to the medial side of the leg.

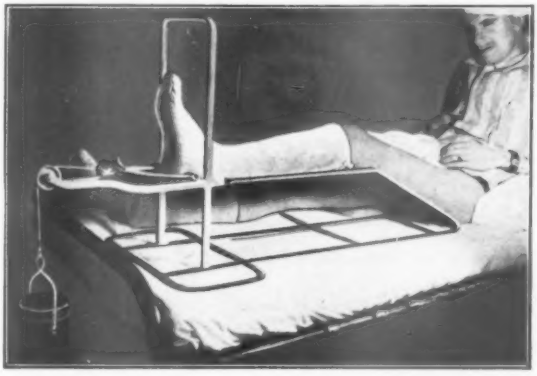


FIGURE XVII. Immobilization of the leg on a Braun cradle splint, with traction by a Kirschner wire through the *os calcis* and a below-knee cast immobilizing a serious fracture dislocation of the ankle (a second degree Pott's fracture). Reduction was easily made, on the screw traction apparatus, with the leg flexed at right angles and a cast applied. Thereafter the limb was placed on the Braun splint and ten pounds traction on the heel still maintained for ten days. No swelling occurred due to the elevated position on this splint, with the foot of the bed raised ten inches. After this time the wire was removed from the heel and the cast built up to the mid-thigh, a walking iron fitted and then walking attempted.

(c) Special Features of Casts Incorporating Skeletal Traction.

The entire leg is prepared with spirit (not iodine, which causes burns under the cast). The skin is shaved for a square inch around the proposed site of bone transfixion. Asepsis must be certain and important anatomical structures must be avoided (common peroneal nerve, see Figure XVI, *c*). Pins should penetrate the centre of the bone; they should pass through the medullary cavity and not merely the compact cortical layer, which may be thereby split. Plaster of Paris is aseptic on hardening and therefore forms a perfect dressing around the skin holes made by the pin, opposite which the plaster splint is split. If sterile gauze or other dressings are placed around the pins, it will be found that they exert local pressure effects under the cast. As a result the affected skin is thin, reddened, moist and sometimes broken, whilst the skin punctures for the pins secrete moisture, indicating a sinus which may be troublesome to heal. As shown in the leg section (Figure XVI, *c*), a third

splint is used in these cases and is placed on the anterior aspect of the leg and upper surface of the foot from the tibial tubercle to the toe clefts. Otherwise the cast may "spring" or bend or crack.

FIGURE XVIII. The formal position (the arm should be abducted only 45°) for reduction by traction in condylar, supracondylar (fracture separation of the epiphysis) and lower humeral shaft fractures. The forearm is fully pronated to avoid *valgus* deformity, which is constantly present in the supinated position (due to stretching on the *pronator radii teres* muscle). The "U" strip plaster splint is applied. Note the felt strip at the upper edge of the cast, which corresponds to the lower edge of the anterior axillary fold.

(f) Weight-Bearing in Walking Casts.

In general, the decision to allow walking is determined by absence of pain and swelling on attempted movements. But it is in regard to the situation of and the type of fracture that one has the data upon which the real and final decision is made as follows:

Fractures of the Femur.—Lusty patients with fractures of the femur who are able to stand the extreme discomfort of the Whitman cast, are urged to hobble around after a few days. Patients with impacted fractures and those operated upon for introducing the Smith-Peterson nail and impacting the neck into the head, can walk in a short plaster cast after five to six weeks. These casts do not hold the limb abducted. The cast merely prevents adduction strain on the neck of the femur.

Fractures of the Femoral Condyles and Tibial Tuberosities.—In fractures of the femoral condyles and tibial tuberosities walking is allowed after six weeks.

Fractures of the Tibial and Fibular Shafts.—In fractures of the tibial and fibular shafts, swelling is the important factor, and until its subsides the cast should not be applied.

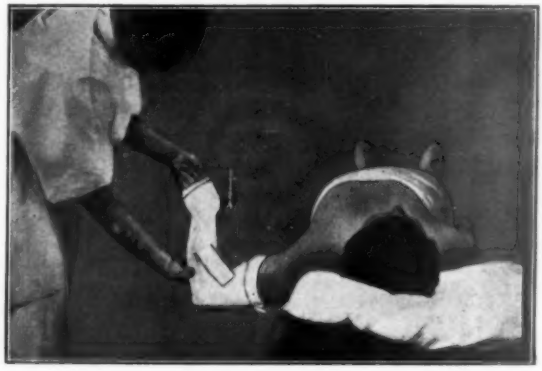


FIGURE XIX. The long splint on the extensor surface of the arm and forearm is applied. It is split on each side opposite the olecranon. The two lateral struts are pasted on. The splint is then encircled with fixation gauze bandages and the whole is finally covered with a single layer of plaster circular bandages. Note how the hand is slightly dorsiflexed and ulna deviated, whilst the thumb is fully abducted and entirely free from the cast. This cast terminates distally in exactly the same fashion as that illustrated in Figures XXIII and XXIV, which are for wrist injuries. All casts for the upper extremity terminate distally in the same manner.

(i) Patients with transverse fractures of the tibia and fibula in the lower third usually walk in one to two weeks, but those with fractures in the upper third in two to four weeks.

(ii) Patients with oblique or splintered and comminuted fractures in any part of the leg should not walk for at least six to eight weeks, unless pins are incorporated in the cast. In the latter case three weeks after the accident swelling has as a rule so disappeared that such a cast may be applied and walking safely permitted.

FIGURE XX. The formal position for maintaining traction and immobility during application of all casts for fractures of the forearm, wrist and hand. The countertraction metal band is two and a half inches wide. The flexor surface of the arm is padded with a piece of felt or other padding.

Fractures of the Ankle (Pott's Type).—Fractures of the ankle of the Pott's type may be considered under several headings.

(i) With no displacement, walking is encouraged after one to two days.

(ii) With moderate lateral and abduction displacement, two to five days should elapse before walking is permitted.

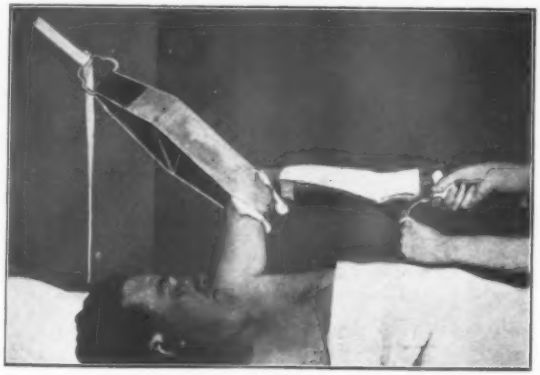


FIGURE XXI. The dorsal splint as shown is the basis of all casts for the wrist and hand injuries. For fractures of the forearm (except at the lowest two inches) a long splint is used, which extends up to the axillary folds between the two layers of the countertraction belt. The cast is otherwise the same for the forearm. But when this cast (extending to the upper arm) is dry, a window is left opposite the padded countertraction belt (or metal band). This defect with the contained pad is now covered in by circular plaster bandages.

(iii) With lateral displacements, but also posterior dislocation due to slight marginal avulsion, five to ten days should elapse before walking is attempted.

(iv) Third degree Pott's fracture. Owing to the splitting of the tibial articular surface, patients with third degree Pott's fractures should not be allowed to walk early, otherwise the foot becomes dislocated with the smaller fragment to which it is attached. These cases are immediately dealt with by two to six weeks' skeletal traction on a cradle splint, at the end of which period the broken bone surfaces are now "sticky"; a long mid-thigh cast is

then applied. If pins, transfixing the heel and upper end of the tibia, are incorporated in the cast, then walking is carried out after two to three weeks. This latter type of cast may be applied immediately on the screw traction apparatus or after one to three weeks of preliminary skeletal traction on a cradle splint (Figure XVII), except some cases of rotated inner malleolus (deltoid ligament intervening), a rarity is it to operate in order to reduce these fractures, even with severe splintering of fragments. The bone assumes normal anatomical outlines, with continuous skeletal pull on the attached periosteum, ligaments and joint capsule in the affected region, moulding the bones into position.

FIGURE XXII. All cases for the upper extremity always terminate distally in exactly the same manner. The trimming of the dorsal splint is important and a common source of error, which prevents free finger and thumb movements. It should extend to the knuckles, but over the thenar eminence it must be trimmed to leave it entirely free. The splint is bound on with gauze bandages, which insure circular moulding.

4. Casts for the Upper Extremity.

(a) Indications for Simple Casts.

Humerus. — Casts are used only in the lower two-thirds of the humerus, that is, in fractures of the shaft, in supracondylar (especially in children) and in condylar fractures. (Fractures of the upper third require traction on a light aeroplane splint.) A cast for elbow fractures is no more dangerous than a cast elsewhere, except that the results of unskilfulness or neglect are more likely to accentuate the vascular obstruction due to the displaced fragments and hæmorrhagic exudate and so to precipitate Volkman's ischæmic contracture

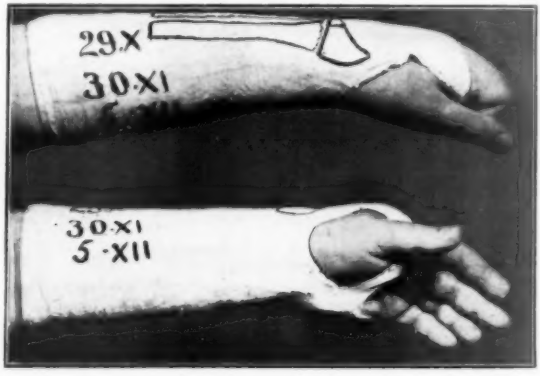


FIGURE XXIII. The dorsal splint has been encircled by a plaster bandage, which in the case of much swelling, as in Colles's fracture, should not be applied over the splint for forty-eight hours. The cast illustrated is that used for any injury of the wrist. Furthermore, it is completed exactly as for any cast of the upper extremity, all casts for which terminate distally in the same manner. Note the entirely free thenar eminence allowing free movement of the thumb metacarpal.

FIGURE XXIV. The same cast seen from the palmar aspect. The narrow loop of bandage in the palm prevents wrist drop and finger metacarpal movements. The thumb, including its metacarpal, is, however, free for all movements. None the less, there is absolute immobilization of all carpal bones, including the navicular (scaphoid), which is thus immobilized, when fractured, in a similar cast, but with the hand slightly dorsiflexed.

(*myositis fibrosa*) as a complication, than they are in other fractures of the upper extremity.

Forearm Fractures.—Fractures of one or both bones are immobilized in a long cast to the upper arm. The fractures of the lowest two inches of the shafts, however, are immobilized as for wrist fractures.

Wrist Fractures and Dislocations.—The short dorsal plaster splint is the basis of casts for wrist fractures and dislocations.

Carpal, Metacarpal and Phalangeal Fractures.—Carpal, metacarpal and phalangeal fractures have extension splints attached to the wrist cast.

(*b*) *Indications for Casts Incorporating Skeletal Traction.*

Forearm Fractures Involving Both Bones.—In forearm fractures involving both bones a cast for the forearm does not ordinarily hold the fragments by traction and countertraction. Certain oblique and comminuted fractures require such traction and therefore the cast is applied whilst this is being maintained (Figure XX). Then a Kirschner wire transfixes the upper end of the ulna and the radius and ulna at the lower ends. The cast is then built up to include the wires in the cast.

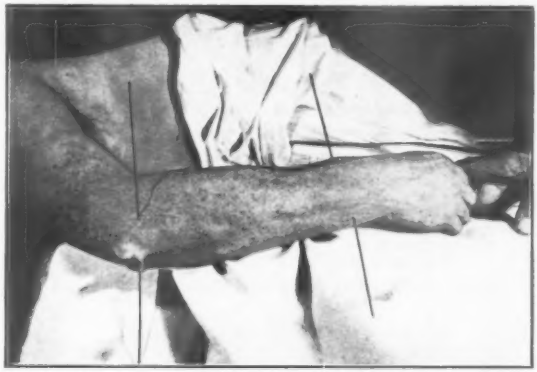


FIGURE XXV. Chromium plated straight piano wires (1·0 or 1·5 millimetres) are seen through the upper end of the ulna and the lower forearm bones. In certain difficult fractures of both bones a simple cast will not maintain good reduction because traction and countertraction are required. An ordinary cast does not provide countertraction, because the flexor surface of the arm is soft and pliable. Traction also is not possible around the wrist, without the lower margin of the cast cutting the skin around the base of the thenar eminence.

Comminuted Fractures of the Lower Half of the Shaft of the Radius. — Comminuted fractures of the lower half of the shaft of the radius are sometimes associated with subluxation at the distal radio-ulnar joint, which allows the thumb and lower end of the radius to slip up in the cast. Skeletal traction is obtained by a fine rustless wire through the neck of the first metacarpal. The pull is taken by a rubber band from the small wire stirrup to an extension support, bound to the cast. This method permits all movements of the first and second phalanges, and is thus superior to transfixing the tip of the thumb.

Splintered Fractures of Three or Four Metacarpal Bones.—In splintered fractures of three or four metacarpal bones a wire through the upper end of the ulna and through the metacarpal necks (II to V) is incorporated in a cast, applied whilst there is traction (Figure XX). As a result, there is good reduction and immobilization, whilst free finger movement may be performed, obviating the very obstinate and crippling sequelæ of stiff fingers when they are individually immobilized.

(*c*) *Position of Limb to Maintain Reduction During Application of the Cast.*

Humerus Fracture.—In fracture of the humerus, the surgeon, bracing his feet firmly, with his shoulders thrown back and with extended forearms, uses strong traction with his right hand on the upper part of the forearm, held at right

angles and fully pronated by his left hand (for injury to the left extremity). Also the wrist is slightly dorsiflexed and the thumb abducted (Figures XVIII and XIX).

Forearm, Wrist and Hand Fractures.—In forearm, wrist and hand fractures traction is made on the thumb (controlling the radius) and on the first three fingers (controlling the ulna), which are painted with mastic gum and then wrapped with gauze bandage, thereby giving a firm purchase. Countertraction is by the four-inch belt (Figure XX). Even when traction is strictly not necessary, for example, fracture of the carpal scaphoid (navicular), the above method should always be used, except that the wrist is maintained in slight dorsiflexion by very lightly pulling on the fully flexed fingers and on the fully abducted thumb.

FIGURE XXVI. A case of fracture in the lower humeral shaft together with a difficult and oblique fracture of both forearm bones, in the same limb, is illustrated. The forearm was first dealt with. Kirschner wires were placed through the upper and lower ends of the forearm. The wire at the upper end, however, was now clamped to a stirrup, which held the wire taut. Countertraction was then obtained from this stirrup, which was attached by a strap to a hook in the wall, because it was impossible to use the countertraction belt (as in Figure XX) around the lower end of the broken humerus. The long posterior splint was then applied, then the short anterior one, both of which are split to enclose the wires. When the cast is finished and hard, traction on the humerus is obtained by the strapping on the outer aspect of the cast as illustrated. The spring balance records usually about five pounds.

(d) Features of Special Casts.

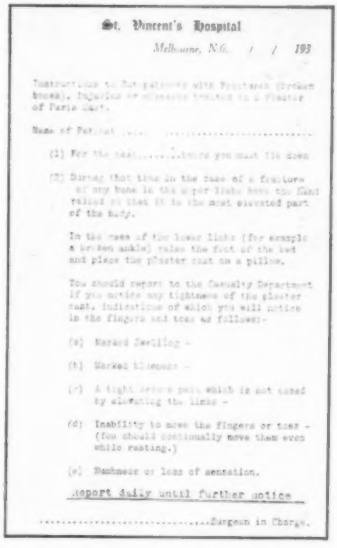
Humerus Casts.—In casts of the humerus, the "U" splint is bound on by a gauze bandage (Figure XVIII), and then the long posterior splint, split opposite the olecranon, is applied to the knuckles and short lateral strut splints are used to reinforce the elbow region, which is otherwise weak and cracks later (Figure XIX). Splints are bound on with gauze bandage. One layer of circular plaster bandage completes the cast. Traction on the pronated forearm until the cast hardens prevents any shortening and *varus* or *valgus* deformities. The anterior angulation due to posterior displacement of the lower fragment (as in fracture separation of the lower fused humeral epiphysis) is controlled by manual palmar pressure (never by finger tips) around the posterior aspect of the elbow. The pressure should be exerted whilst the cast is soft and maintained until it is hard.

The lower end of these casts is finished exactly as for wrist casts (see below).

Forearm Casts.—The basis of the forearm cast is the application of a long posterior splint from opposite the middle of the deltoid (corresponding to the lower margin of the anterior axillary fold) to the metacarpal necks (II to V), but the thumb metacarpal is left entirely free. Such a splint is applied whilst powerful traction is being exerted (Figure XX). There is sufficient room between the two layers of the traction belt for fitting the splint on to the extensor surface of the arm and forearm. The splint is bound on with the gauze bandage and then encircled by one layer only of plaster bandage. When, however, there is

narrowing of the interosseous space, in addition to the posterior splint a short anterior splint, three inches in width, is applied on the flexor surface of the forearm from the elbow to the base of the thenar eminence. Then two cigar-shaped wooden pegs, half an inch by five inches, are impressed on the anterior and posterior splints, so that the muscles are pressed into the interosseous space, the normal width being thereby restored. The angulation forwards causes loss of the anterior curvature of the forearm bones, thereby affecting the direction of the long flexor tendons into the radio-carpal tunnel. It is corrected by exerting pressure on the posterior peg which is placed more distally than the anterior one. The two splints and pegs are now covered with one layer of circular plaster bandages.

Wrist and Hand Casts.—The basis of wrist and hand casts is the posterior splint (Figure XXI) which is trimmed to leave the finger knuckles just free and the thenar eminence entirely free. It is bound on with gauze bandages and then two days later, that is, when all swelling has subsided, it is covered with a starch bandage (because of its extreme lightness) or with a plaster bandage (Figures XXII and XXIII). Posterior tilting and displacement of the lower fragment in Colles's fracture is controlled with bipalmar pressure until the cast hardens.



St. Vincent's Hospital

Melbourne, N.6. / / 193

Instructions to be explained with Fractured (broken bones), Injuries or Diseases treated in a Plaster of Paris Cast.

Name of Patient .....

(1) For the next.....hours you must lie down

(2) During that time in the case of a fracture of any bone in the upper limbs keep the limb raised so that it is the most elevated part of the body.

In the case of the lower limbs (for example a broken ankle) raise the foot of the bed and place the plaster cast on a pillow.

You should report to the Casualty Department if you notice any tightness of the plaster cast, indications of which you will notice in the fingers and toes as follows:-

(a) Marked Swelling -

(b) Marked Blueness -

(c) A tight intense pain which is not eased by elevating the limbs -

(d) Inability to move the fingers or toes - (You should continually move them even while resting.)

(e) Numbness or loss of sensation.

Report daily until further notice

.....Surgeon in Charge.

FIGURE XXVII. All ambulatory patients are given this card, which they are then requested to read immediately. They then sign their name in a book, in which they acknowledge not only receipt of the card of instructions, but also their thorough understanding of them. In the case of minors the parents must do this.

(e) Special Features of Casts Incorporating Skeletal Traction.

Rustless steel wire of 1·5 millimetre gauge transfixes the olecranon at the upper end, avoiding the elbow joint and the ulna nerve. The radius and ulna, just above the wrist joint or the metacarpal necks (II to V), are transfixed at the lower end (Figure XXIV). Traction is made on the fingers as in Figure XX; more satisfactory countertraction, however, is obtained from the upper wire clamped to a stirrup, which is connected by a strap to a wall hook. No dressings are placed around the wire holes in the skin, but the plaster splints are slit opposite the wire. Small collars are placed over the wire, the ends are snipped, and the whole is wrapped in a circular plaster bandage.

5. Control of Fractures in Unpadded Casts.

Control X ray pictures are made immediately after application of the cast. If the position is found to be unsatisfactory, the cast is removed and the reduction is attempted again. If reduction is found to be satisfactory, control X ray pictures are taken every fourteen days, except in simple cases, because redisplacements occur when the swelling subsides, and especially in "walking casts". Deformity, such as angulation, calls for removal of the cast and application of a new one. Very often, however, it is possible to correct angulation by cutting a slice like an orange quarter from one side, softening the opposite side with water and then bending the cast, which is subsequently strengthened. Such a procedure should be conducted under X ray control.

6. Precautions.

Before Application of the Cast.

Before application of the cast, the following precautions must be taken.

1. Reduction must be good and in the case of the lower extremity should be perfect, almost.

2. The hæmatoma and exudate in wrist, elbow and ankle fractures should be pressed away by firm massage for ten to twenty minutes.

3. In elbow fractures when marked swelling is present, reduction is first performed, especially if the pulse is weak or has disappeared, as in impending Volkman's contracture. Then the olecranon is transfixed by a Kirschner wire and the stirrup is attached. The arm is now suspended from the stirrup by a ten pound weight from a cord which runs around an overhead pulley, attached to a Balkan beam. The arm is thus held vertically. The elbow is the highest point, and the forearm is flexed at right angles and fully pronated, suspended by a sling from the horizontal Balkan beam. Reduction is safely and well maintained thereby. Swelling disappears within a few days with the limb so hanging and the elbow cast is now applied as described above.

4. In tibia and fibula fractures it is necessary to await subsidence of the swelling.

During Application of the Cast.

During application of the cast details of technique must be attended to even when there is no displacement of bone ends. The technique of the unpadded cast becomes a far more difficult surgical procedure, however, when it is used for maintaining the reduction of a fracture deformity, which tends to recur until the cast has hardened. Careful moulding must be attended to. Such moulding is hardly possible with bandages which set within two minutes or so; on the other hand, maintenance of the reduction is not possible with casts which take over ten to fifteen minutes to harden. Some plaster bandages harden only after hours and are useless. No movement of the limb should occur. Encircling bandages should not be drawn tight. Pressure points must be avoided.

However, when the cast is completed, but not yet hard, it is necessary in the following cases to use pressure on the outside of the cast to control the deformity:

(*a*) Ankle fractures having the tendency for the foot to become displaced laterally require bimalleolar pressure with cupped palms of the hands until the cast is set.

(*b*) The cupped hand is also used to press forwards the posterior displacement of the lower fragment in a supracondylar fracture of the humerus. Counter-pressure in these circumstances is obtained from the flexor surface of the arm. Meanwhile, the assistant should continue pulling on the flexed and pronated forearm.

(*c*) The pressure exerted on the wooden pegs which indent the inner aspect of the splints in forearm fractures (with encroachment on the interosseous space by the four fragments) is obtained by the two palms, one hand of which rests on the surgeon's knee.

(*d*) In Bennet's stave fracture of the base of the first or thumb metacarpal, the metacarpal is radially dislocated. This is controlled by pressure on the outside of the cast with the pulp and flexor surface of the thumb and not with the thumb tip of the operator.

After Application of the Cast.

After application of the cast the limb is immediately elevated. If, despite this precaution, swelling and evidence of vascular obstruction have not become less pronounced, the cast is split. If this also fails to relieve the obstruction, then the cast is removed. Another cast is then applied. Patients should never be given morphine, which masks pain due to a tight cast. Instructions in regard to a tight cast are given to ambulatory patients (Figure XXVII), and they sign a book stating that they have received such instructions. Special precautions are

necessary when patients with fracture of the lower extremity are permitted to walk, as follows:

1. The cast should extend high enough to immobilize the fracture.

2. Under ideal conditions the cast should be applied in the absence of swelling. Therefore in ankle fractures the hæmatoma and swelling should be pressed up into the muscles of the calf. Good moulding around the malleoli is then obtained, obviating the danger of the recurrence of abduction deformity. In fractures of the tibial or fibular shafts, however, it is impossible by massage to remove this swelling due to blood clot and therefore the cast is not applied immediately (two to three weeks later).

3. Every ten to fourteen days control X ray examinations are essential in order to detect early recurrence of deformities. These occur because swelling has subsided. Exercise increases the blood flow through the limb, removing the exudate and hæmatoma not entirely removed by massage or gravitational drainage of the limb on the elevated Braun splint (precautions which are a counsel of perfection). On removing such a cast, one may be amazed to find that it is adherent to the skin, there being no free space anywhere between the skin and cast, which apparently fits snugly; yet it has failed to prevent angulation or other deformities developing. However, although the skin and cast may be adherent, the swelling in the muscles and subcutaneous tissues has subsided. It is into the cellular loose spaces of the latter that the fragments now project. They are really unsupported by the cast and the walking precipitates the development of some deformity. If the fragments are end to end, as in fractures of the lower third of the leg, antero-posterior angulation develops; if the fragments are end to end in the upper part of the leg, *varus* or *valgus* deformity develops. In oblique fractures, the original deformity may recur, even with projection of the bones through the skin in neglected cases.

4. When walking is permitted, the patient is advised to proceed gradually, increasing the distance walked daily until two to three miles are within his daily capacity. It must be admitted that a great deal of encouragement is sometimes necessary. Use of the double crutch should be soon followed by the use of one, and then by walking sticks. Swelling of the toes develops at first, but the patient should raise the leg for a while until it disappears. Then he should proceed walking again.

7. Advantages of Unpadded Plaster of Paris Casts.

It will be generally admitted that any form of correctly made plaster cast (whether padded or unpadded) is the most superior form of splint because it fits the particular case for which it is being used. Plaster casts are cheap, light, strong and always reliable. Some surgeons, however, prefer to use a splint, such as a wooden splint, which has been very well padded, because it is not associated with the anxiety and responsibility attaching to the use of plaster casts. Such a lack of anxiety is based on the knowledge that no pressure is being exerted to maintain the reduction, even in a case tending to bone displacements.

The advantages of the unpadded cast are as follows:

1. The unpadded cast is applied directly to the skin, and may be regarded as a closely fitting integument, the hard surface of which is distributed equally over the entire area of the limb. Accordingly, it is less likely to cause pressure sores than any other splint. It is more easily moulded than the padded type. Casts lined by stockinet may be regarded as virtually unpadded. They, none the less, have the serious disadvantages that the stockinet is thrown up into folds during the moulding, whilst over flexed joints its forms troublesome ridges and finally it does not fit cone-shaped extremities without causing some constriction in the greatest diameter of the limb. For this latter reason these types are split or bivalved, whereas the unpadded variety is rarely split.

2. The skin is incorporated in the plaster by the hairs and skin pores. As a result, when swelling subsides, the skin is still adherent to the inner surface of the cast. Thus pressure sores are a rarity. Further, plaster of Paris is aseptic

when hard. Therefore, if pressure sores occur, they are not serious. They are also detected very early owing to the thinness of the cast.

3. The splint method of building up a cast results in an exact moulding of the limb, whereas casts made from circular bandaging constrict the limb.

4. The well-fitting unpadded cast does not allow deformity to occur. With padded casts deformity is so common an occurrence that "over-correction" is often recommended. For example, in fracture-dislocation of the ankle, the long muscles tend to produce recurrence of the lateral displacement. The external malleolus becomes displaced into the soft padding, especially when the swelling subsides. The padding is compressed, or becomes loose in parts and so predisposes to pressure sores. The immobilization is now inadequate and the original deformity has recurred, in part at least.

5. The imbedding of transfixion pins or wires in the plaster cast for difficult cases obviates operation, and if operation is performed the problem of maintaining fixation still remains. This procedure is recommended by Hey Groves, and is given importance in the latest edition of "Choyce's Surgery". It was also described in this journal in the issue of September, 1931, at page 142.

6. Functional treatment cannot be so adequately carried out in the padded variety, because the padding is compressed and slips around within the cast. With metal and wooden splints for the lower extremity walking is impossible, on account of the splints not being weight-bearing and of their becoming disarranged. With these types of splints recumbent treatment is often necessary. Accordingly, the necessary massage and other methods of treating muscle stiffness and wasting *et cetera*, greatly prolong the course of such a case.

7. These casts are equally suitable for the aged and for the youngest child.

CONCLUSION.

The unpadded plaster cast is an exact and perfectly fitting splint. It maintains reduction, immobilizing the injured parts, despite which it permits active movements of the affected limbs.

A technique which is now standardized permits such splinting methods to be used with absolute safety. It is necessary that extreme attention to meticulous detail be linked with experience in order to avoid the obvious dangers of such methods of splinting recent fractures.

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THE VOELCKER TECHNIQUE OF EXTRA-PERITONEALIZATION OF THE BLADDER IN PARTIAL CYSTECTOMY.

By HENRY MORTENSEN,
Melbourne.

IN the treatment of carcinoma of the bladder three methods are available to the surgeon: (i) Diathermy either by a perurethral method or through the opened bladder. (ii) Radiotherapy by the implantation of radium needles or

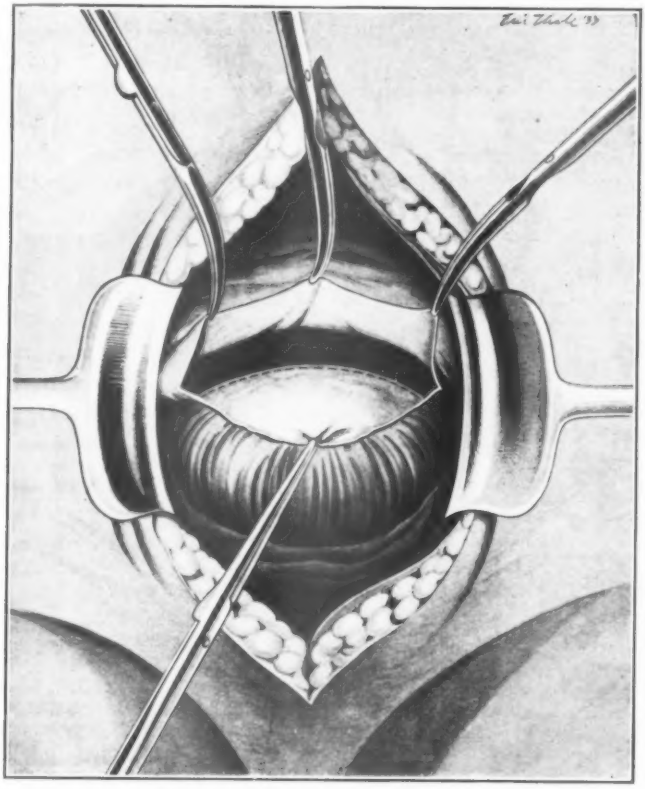

FIGURE I. Demonstrating the incision through the peritoneum at its reflection anteriorly on to the bladder and the line of incision posteriorly.

radium emanation seeds. (iii) Direct surgery in the nature of a partial or complete cystectomy.

Partial cystectomy in the suitable case is the treatment of choice for malignant growth and in late cases complete cystectomy has been practised. In the performance of the operation of resection of the bladder wall the ease or difficulty of the procedure depends to a great degree on the site of the tumour. The easily approached superior surface and vertex of the bladder are rarely

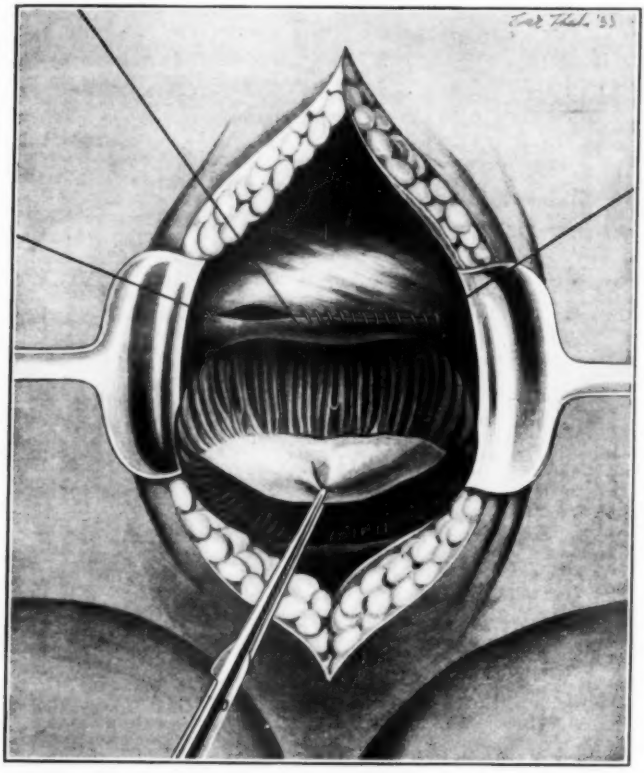

FIGURE II. Demonstrating the peritoneum being reconstituted by a line of closely set sutures and the mobilization of the bladder.

attacked. Most of these carcinomata, unfortunately, occur around either ureteric orifice when the technical difficulties of removal may be great. Coupled with this is the necessity for dealing satisfactorily with the involved ureter, which in many instances must be transplanted.

In an attempt to remove the tumour through the ordinary extraperitoneal incision, two dangers are encountered: first, the risk of accidentally opening the peritoneum; and, secondly, that, owing to the inadequate access, the tumour may not be completely removed. A procedure which simplifies operation in

this site to a tremendous degree is therefore worthy of note. In the Voelcker method of extraperitonealization of the bladder the primary steps of the operation are directed to freeing the bladder from its peritoneal attachments. The bladder being exposed, an incision is made anteriorly and posteriorly through the peritoneum at its attachment to the bladder (Figure I). A routine exploration of the abdominal contents is made, and these incisions are then united by closely set sutures and the peritoneal cavity reconstituted (Figure II). A pack is placed over the line of suture as a safeguard against probable leakage when the bladder is opened. It is then possible to strip down the bladder from its loose fascial attachments posteriorly to the rectum in the male and the vagina in the female, and the bladder becomes a freely mobile organ. This procedure renders all parts of the bladder easily accessible for any operative manœuvre. To demonstrate this, the case report of a patient so treated for carcinoma of the bladder is appended.

Miss B.W., aged fifty-two years, complained when first seen of a slight degree of smarting on micturition. This followed on a history of papilloma being treated three years previously by three applications of the diathermy current. Cystoscopy revealed the presence in the region of the right ureteric orifice of a tumour with broad base, but no evidence of infiltration of the surrounding mucosa. An attempt was made to treat this by the diathermy current, but as subsequent cystoscopy revealed further growth of the tumour which now had an ulcerating surface, and a bullous œdema surrounding it, partial cystectomy was decided upon. The technique as described above of suprapubic exposure with extraperitonealization was used. On mobilization of the bladder a large growth, approximately 2·5 by 3·5 centimetres, was found to be infiltrating the right ureter, and completely involving the whole muscular coat. The right ureter was cleared and divided well clear of the growth, and the bladder was opened on its lateral aspect two centimetres from the palpable edge of the growth. At this distance from the tumour the bladder wall was divided and the tumour removed, the divided ureter was then loosely stitched to the remaining bladder wall on the right side and the severed edges of the bladder were brought together by sutures, and around a large rubber tube. The subsequent course of the patient was uneventful and she was able within six weeks to retain fifteen ounces of urine with comfort. Cystoscopy and the injection of indigo-carmine some time after this revealed a normally functioning kidney on both sides, whilst apart from the inevitable scarring the bladder mucosa was normal.

Case Reports.

A NASAL PROSTHESIS.

By DAVID WHYTE,
Wellington.

THE case here described illustrates the use of a nasal prosthesis following the wide ablation of a malignant growth (Figures I and II).

The appliance was made in the Dental Department, Wellington Hospital, by Mr. E. Gordon Bender, Senior Dental Surgeon, was completed within one week, and was charged to the hospital at ten guineas. The material is pink vulcanite, subsequently tinted with artist's colours.

FIGURE I. FIGURE II.

It would seem that the appliance offers the following advantages:

1. It is easily and quickly fitted after the primary operation.
2. Recurrences can be seen and dealt with readily.
3. It allows natural warming and moistening of inspired air.
4. It is comfortable and secure.

5. The patient is able to go about in the world with restored confidence soon after the mutilating operation, and is spared the pain, doubt and worry of plastic work.

6. There is no prolonged occupation of a hospital bed. The financial advantage, to hospital board and patient, is obvious.

The appliance shown is being returned to have bifocal lense fitted. This point should be noted where such an appliance is under consideration.

Case Report.

Mrs. S. C., aged sixty-seven years, was admitted to Wellington Hospital on July 21, 1932, and was discharged on September 9, wearing the prosthesis. She was shown at the Royal Australasian College of Surgeons meeting in Wellington on September 7.

The history was one of gradual ulceration of the nose over some years. A large ulcer involved the left side of the nose and adjacent cheek, the left *ala nasi* was destroyed, with the anterior part of the septum.

Operation was performed on July 22. Under choloroform anæsthesia, the remains of the nose were removed by the cutting current and the septum with scissors. Polypoid masses filling the nasal cavity were scooped out. The lateral walls were not involved. The whole cavity was packed with flavine-vaseline gauze. This was removed next day under gas anæsthesia, and the cavity was subsequently douched. Healing was rapid.

The pathological report read as follows:

> The specimen is all tumour. In some areas the histological features are those of a rodent ulcer, but the main mass of the tumour is epitheliomatous. Cell nests are present. The specimen is an actively growing squamous cell carcinoma.

On August 15, under local anæsthesia, a small suspicious area at the front of the right lateral wall was removed. Pathological examination revealed an inflammatory granulation. Small sequestra of the nasal bones were also dislodged. At the end of the month healing was complete and the patient was sent to the Dental Department for fitting.

RESECTION OF THE PRESACRAL NERVE FOR PAINFUL BLADDER.

By DAVID WHYTE AND P. A. TREAHY,
Wellington.

THE patient whose history is herein described, sought relief from severe pain and frequency of micturition due to a contracted bladder, which was the site of a large intractable ulcer. The presacral nerve was resected with an entirely satisfactory result.

Theoretical Considerations.

The bladder has a double nerve supply. The sympathetic, arising in the thoracico-lumbar outflow (the twelfth thoracic and first and second lumbar nerves), reaches it by the presacral nerve; and its terminal branches, the hypogastric nerves, are inhibitory to the expulsive mechanism and increase sphincter tone. The parasympathetic, passing *viâ* the sacral outflow (second and third sacral

nerves), travels in the pelvic visceral nerves, is expulsive in function and inhibits the sphincters. It may be regarded, says Langdon Brown, mainly as a mechanism for emptying.[1] Both sets of nerves carry afferent fibres. In addition, the external sphincter is innervated by the internal pudic nerve. Learmonth states that those afferent fibres subserving the emptying reflexes of both bladder and rectum appear to reach the spinal cord solely in the pelvic nerves.[2] On the other hand, there is some evidence that pain fibres travel in the sympathetic. Langdon Brown writes:[3]

> In the thoracic and abdominal viscera most of the afferent fibres which on electrical stimulation give rise to pain, pass by the sympathetic, and not by the vagus. They appear to have their trophic centres in the posterior root ganglia.

Learmonth and Braasch state that section of the presacral nerves abolishes intolerable pain in long standing cystitis.[4] Further, Learmonth, whilst operating under spinal anæsthesia, learnt that "stimulation of the central end of the cut presacral nerve by pulling on it led to sensations of crushing pain accurately referred to the bladder, and not to the corresponding dermatomes".[5] Learmonth has recently tabulated the details of eleven operations for vesical pain, and considers that the type of pain fibre which traverses the sympathetic system is concerned in registering spasmodic contractions.[6]

The outcome of the present case is that pain has been relieved from the day of operation without interference with satisfactory bladder function. The bladder now fills naturally to 300 cubic centimetres (ten ounces); the patient is then conscious of a sense of fullness with desire to micturate; the bladder empties completely, there being no residual urine; control and expulsion are normal; and the ulcer has healed. As to healing, Learmonth advances the hypothesis that division of the vasoconstrictor fibres passing to the bladder by way of the presacral nerves will lead to active hyperæmia which will favour healing of the vesical lesion.[7]

Case Report.

Mrs. M., aged forty years, in 1921 complained first of frequency of micturition, half hourly by day and hourly by night, of dysuria felt in the urethra as a sharp pain during micturition and also felt in the suprapubic region before, during and after micturition. In June, 1921, she was admitted to the Dunedin Hospital with a diagnosis of pyelonephritis. The pelvis of the left kidney was drained; the drain came out and could not be replaced. Frequent treatments with urinary antiseptics proving of no avail, the left kidney was removed.

Catheter specimens examined bacteriologically revealed a *Bacillus coli* infection. After operation the patient was treated by bladder lavage for two years with incomplete relief. A recurrence in 1927 of the original syndrome above described was treated by removal of the remainder of the left ureter, which was described by the surgeon in a private communication to one of us as being as large as a sausage and full of pus. No relief ensued for a month; then some cystoscopic treatment was carried out, which was followed by partial relief of symptoms until April, 1932, when the syndrome recurred with great severity. At this stage she first came under our observation. Examination revealed a contracted bladder. The capacity was 90 cubic centimetres (three ounces) under low spinal anæsthesia. A large ulcer, covered with phosphatic *débris* and shaggy exudate, occupied most of the posterior wall and involved the right ureteric orifice, which was large and œdematous (Figure I). The right ureter was catheterized and a pyelogram was made. This showed a moderate degree of pelvic distension in an hypertrophied kidney. The urine was infected with *Bacillus coli*. Repeated examinations of urine and several guinea-pig inoculations failed to show evidence of tuberculosis. The bladder could be palpated bimanually as a firm tender structure. Treatment in hospital by bladder instillations, hydrostatic

FIGURE I.

FIGURE II.

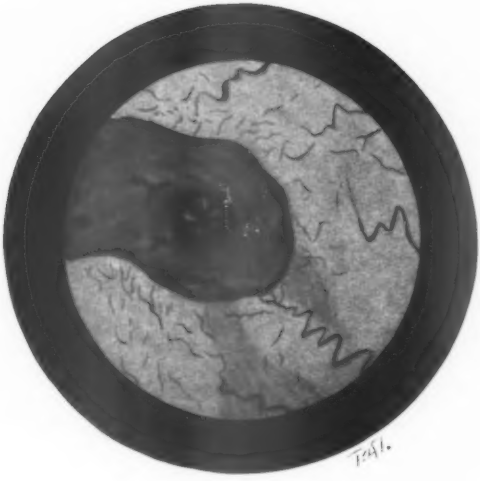

FIGURE I. Cystoscopic picture showing large ulcer surrounding the right ureteric orifice.

FIGURE II. Cystoscopic picture eighteen days after operation. The ulcer is healing.

dilatation, and cystoscopic fulguration of the ulcer, was carried out for three months without avail. At this stage the condition of the patient was one of intense misery. She was passing urine in small quantities every half hour by day and night, she had severe pain in the urethra on micturition, and also in the suprapubic region before, during and after the act. Relief from her misery became imperative.

The following procedures were considered:

1. Transplantation of the remaining ureter into the colon. This presented obvious disadvantages on account of the risk and the objectionable after-result.

2. Partial cystectomy with transplantation of the ureter into the bladder. This was rejected on account of the probable difficulty of the procedure in such

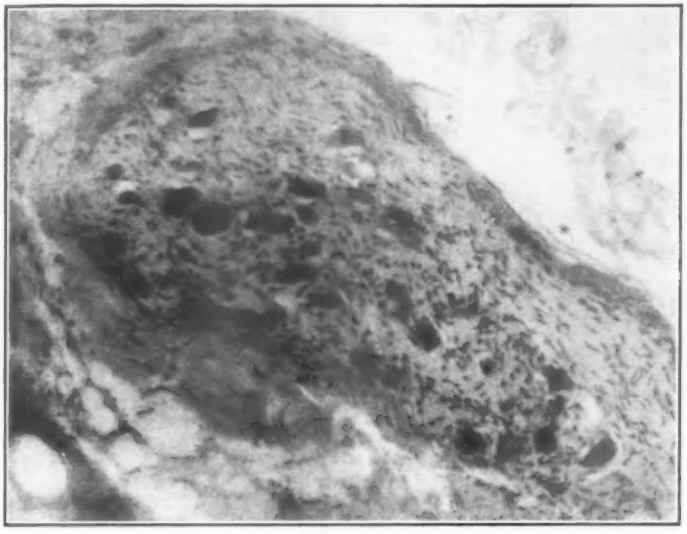

FIGURE III. Photomicrograph, showing ganglion cells and nerve fibres.

a contracted bladder, and the disadvantage of interfering with the mechanism of a single kidney.

3. Division of afferent pain fibres from the bladder by resection of the presacral nerve. This offered a reasonable chance of relief from the vesical pain and would allow of post-operative hydrostatic dilatation to increase the bladder capacity. In the outcome it has attained much more.

Operation was performed on September 14, 1932. Under ether anæsthesia a left paramedian lower abdominal scar was excised and the abdomen was opened. Omental adhesions were freed. A cyst was excised from the left ovary, and the appendix was removed. The intestines were packed away. The peritoneum of the posterior abdominal wall was incised in the mid-line over the fifth lumbar vertebra, and this incision was extended up and down for about 7·5 centimetres (three inches). A vessel in the peritoneum was divided between light artery forceps and tied. The hypogastric nerves were picked up as two

lateral cords and a plexus was dissected out between them in the upper area. As tension was put on the plexus, some lateral branches were shown. The hypogastric nerves were divided below over a ligature. It was observed that with slight tension they stood out as retroperitoneal cords leading towards the recto-vesical space. By upward traction lateral branches were put on the stretch and divided, and then the mass of nerves was severed above over a ligature. The incision in the posterior peritoneum was closed with a running catgut stitch, and the abdominal wall was sutured in layers. A de Pezzer catheter was left in the bladder *per urethram*.

The whole of the tissue removed was made into a block for pathological examination. Section shows that the tissue contains bundles of nerve fibres and many ganglion cells (Figure III).

Convalescence was smooth. The catheter was removed on the sixth day. The bladder was washed out daily by the sister of the ward, whose record shows that the bladder capacity increased from 30 cubic centimetres (one ounce) before operation to 390 cubic centimetres (thirteen ounces) on the thirteenth day after the operation. By this time the patient was passing urine only every three and a half hours.

On the eighteenth day cystoscopy was performed. There were a few patches of vascular arborization in the fundus. The ulcer in the region of the right ureteric orifice was healing (Figure II). There was a patch of raised epithelium resembling leukoplakia in the fundus. The bladder was distended comfortably when it held 180 cubic centimetres (six ounces).

Three weeks after operation the patient was discharged from hospital. By this time her bladder capacity was 390 cubic centimetres (thirteen ounces); and urine was passed every four hours. Since the operation she has been entirely free from pain.

Cystoscopy six weeks after operation showed that the ulcer had healed.

Eight months after operation she was free from symptoms and cystoscopic examination showed the ulcer to be soundly healed.

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THREE CASES OF FAMILIAL OSSEOUS DYSTROPHY.

By D. OFFICER BROWN AND COLIN MACDONALD,
Children's Hospital, Melbourne.

THREE cases are described of osseous dystrophy of the familial type described originally in 1929 by Morquio, and of which about sixteen cases have since been recorded. Our three cases comprise one female patient, aged thirty-eight years, and her two children, both females, aged twelve years and nine years respectively.

Case Histories.

CASE I.—E.C., aged twelve years, first came under the observation of a physician in 1930 with the complaint of indefinite abdominal pain. The urine

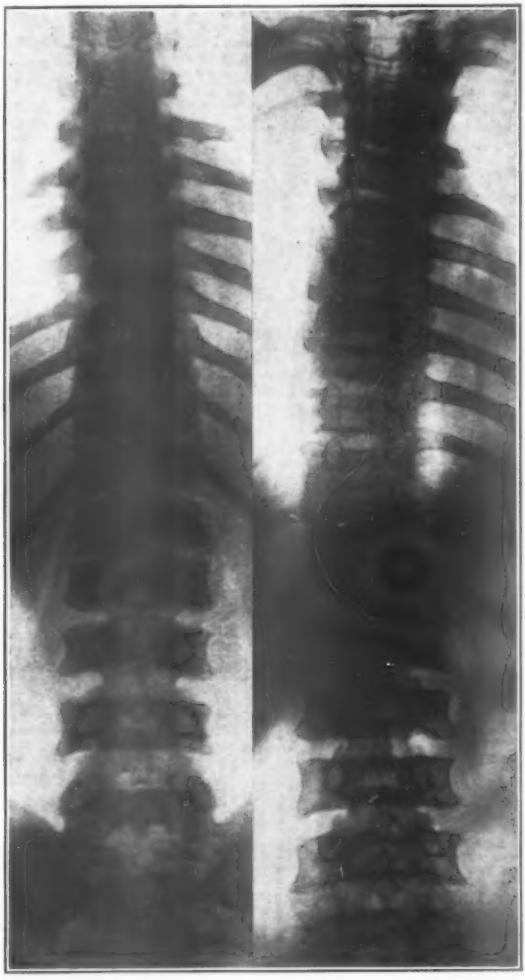

FIGURE I. Younger child. Antero-posterior view of spine.

FIGURE II. Elder child. Antero-posterior view of spine.

showed marked bacilluria; with appropriate treatment this condition improved, and there was no further complaint of pain. Slight kyphosis was observed at

this time. The child was next seen in 1932, when a complaint of pain in the right knee and backache drew attention to her condition, which was then fully investigated from a radiological standpoint.

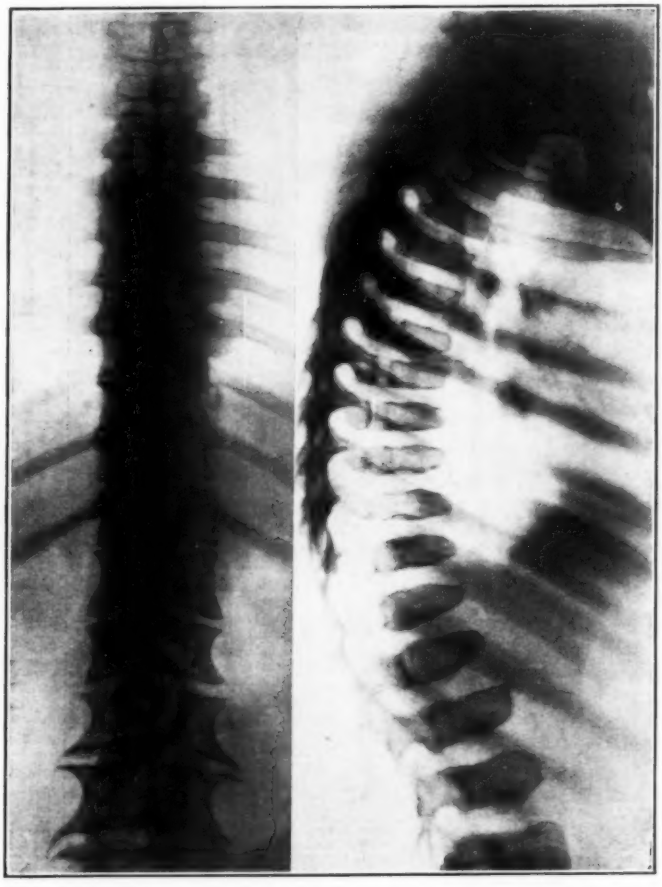

FIGURE III. Mother. Antero-posterior view of spine.

FIGURE IV. Younger child. Lateral view of spine. Figures I and IV show the mild kypho-scoliosis and platy-spondylia. As the epiphyseal plates have not yet commenced to ossify, the outlines of the vertebræ are sharply defined.

At the present time the child is 1·24 metres (four feet one inch) high, and weighs 27·23 kilograms (four stone four pounds), so that, although slightly below the average height and weight, she is not a dwarf. Head circumference is

51·25 centimetres (twenty and one-half inches). There are no stigmata of syphilis and no evidences of dysthyreoidism or dyspituitarism. The nasal bridge is well developed. There is some lordosis and pot belly. The arms and hands are well

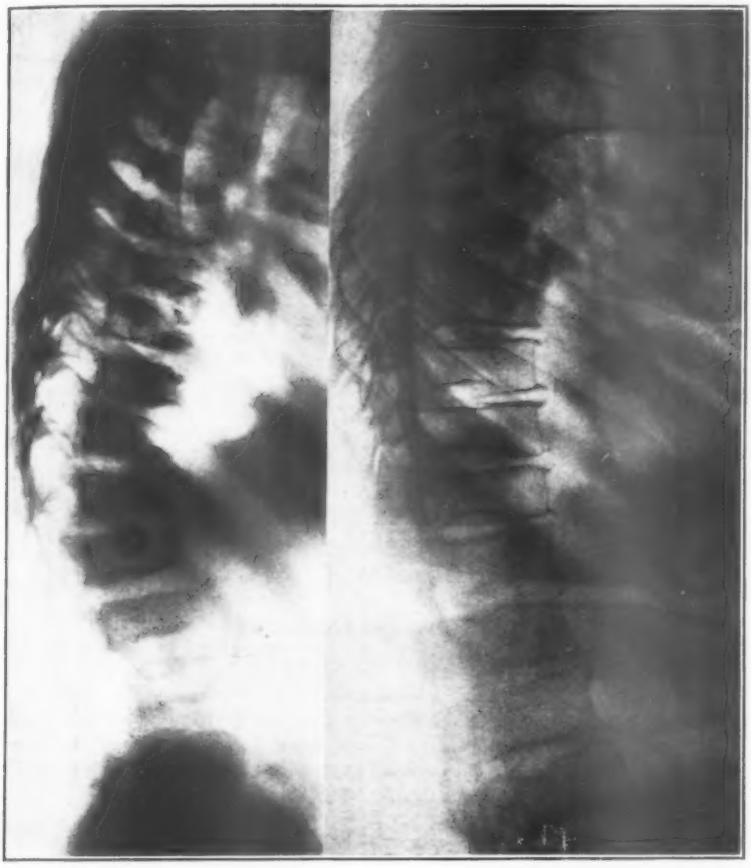

FIGURE V. Elder child. Lateral view of spine. Figures II and V show the mild kypho-scoliosis, platyspondylia and the irregular ossification of the upper and lower epiphyseal plates, the latter resembling Scheuermann's disease.

FIGURE VI. Mother. Lateral view of spine. Figures III and VI show the platyspondylia, lipping of the anterior and lateral vertebral margins, and the concave depressions on the upper and lower vertebral surfaces, due to the dome-like expansion of the *nucleus pulposus* into the malacic body.

proportioned and of equal length, and there is no suggestion of the trident hands of achondroplasia. The lower limbs are well proportioned and of equal length. There is a flexion deformity of 10° in the right hip and of 5° in the left hip.

There is marked limitation of the movements of abduction, external rotation and hyperextension, and some limitation of internal rotation on both sides. Some adductor spasm is evident. There is slight *valgus* deformity at the knee joints

FIGURE VII. Younger child's pelvis, showing the bilateral *coxa vara*, imperfect ossification of the epiphysis for the left femoral head, and irregular ossification around the acetabular margins.

FIGURE VIII. Elder child's pelvis, showing the bilateral *coxa vara* and the irregular ossification in the metaphyses.

and at the metatarso-phalangeal joints. There is a fairly marked kyphosis of the lower thoracic part of the spine. There is no scoliosis. The mentality is somewhat retarded, but the child is bright and active.

Examination of the other systems reveals no abnormality.

The blood contained 4·4 milligrammes of phosphorus per 100 cubic centimetres, and 12·7 milligrammes of calcium per 100 cubic centimetres of blood serum. There was no reaction to the Wassermann test. The sugar tolerance was normal.

CASE II.—J.C., aged nine years, first came under observation in 1930 with complaint of pain in the left leg and slight limp. Radiological investigation again demonstrated the nature of the condition.

At the present time the child is 1·17 metres (three feet ten inches) in height, and weighs 25·41 kilograms (four stone), again slightly below average, but not a dwarf.

There are no stigmata of syphilis and no evidence of dysthyreoidism or of dyspituitarism. The nasal bridge is well developed. There is some lordosis and

FIGURE IX. Mother's pelvis, showing the clumsy appearance of the pelvic bones and the bilateral *coxa vara*.

pot belly. The head circumference is normal. The arms and hands are normal. The left leg shows 0·94 centimetre (three-eighths of an inch) shortening as compared with the right. There is a flexion deformity of 5° at each hip joint. There is marked limitation of abduction and hyperextension at both hips, marked limitation of external rotation on the left side, less marked on the right side, and slight limitation of internal rotation on both sides. There is marked kyphosis of the mid-thoracic spine. There is no scoliosis. The mentality is again somewhat retarded. The blood contained 4·1 milligrammes of phosphorus per 100 cubic centimetres and 13·6 milligrammes of calcium per 100 cubic centimetres of blood serum. There was no reaction to the Wassermann test, and the sugar tolerance was normal.

CASE III.—Mrs. C., aged thirty-eight years, presents similar characteristic features. Her height is 1·47 metres (four feet ten inches). Her weight is 82·54 kilograms (thirteen stone). She shows no stigmata of syphilis or of endocrine dysfunction, there is no reaction to the Wassermann test, and her sugar tolerance is normal. Her two confinements were uneventful and without difficulty.

Radiological Findings.

Cranium.—All three cases show small *sellæ turcicæ* with particularly heavy clinoid processes. These abnormalities have previously been noted by Ruggles[2]

and by Dale[4] in familial osteochondropathy. The remainder of the cranium is normal.

Ribs.—The ribs are normal in all these three cases. In the cases of Morquio,[1] Ruggles,[2] Brailsford[3] and Dale[4] the ribs were abnormally broad.

Shoulder Joint.—The mother shows marked irregularity of bony outline of the humeral head, glenoid cavity and acromial end of clavicle. The humeral metaphysis is thickened and the density of the head is uneven. A similar finding was noted by Brailsford in his patient of four years of age, though in these children there is no abnormality except, perhaps, a little irregularity of the convexity of the humeral epiphysis.

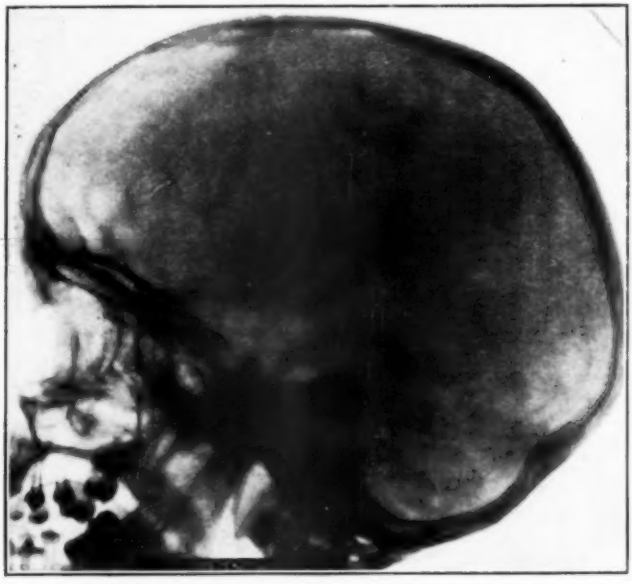

FIGURE X. Younger child's cranium, showing small *sella turcica* and thickened *dorsum sellæ*.

Diaphysis of Humerus.—No abnormality of the diaphysis of the humerus is present in any of the three cases.

Ulna and Radius.—The mother shows blunting of both the radial and ulnar styloid processes. The children are normal in this regard.

Carpus.—The mother shows general irregularity of outline of all the carpal bones; those of the children are normal.

Metacarpals.—In all these cases the metacarpals are within normal limits; no accessory epiphyses are present.

Fingers.—No deviation from normal is noted in the fingers in all three cases.

Spine.—The mother shows platyspondylia involving the whole of the dorsal and lumbar vertebræ, which also show gross lipping of their anterior and lateral margins. The bodies also show concave depressions on both their upper and lower surfaces, due, as Schmorl of Dresden has shown, to dome-like expansion of the *nucleus pulposus* of the intervertebral disk. Both the bony lipping and the disk expansion are the result of the malacic process in the vertebral body. There is a mild kyphosis, but no scoliosis.

FIGURE XI. Elder child's cranium, showing small *sella turcica* and thickened *dorsum sellæ*.

The elder child, aged twelve years, shows a mild kypho-scoliosis in the lower dorsal region, together with striking bony changes in all the vertebræ. These show the platyspondylia, wedging and lipping, together with disk expansion. Ossification is very irregular, particularly in the region of the upper and lower epiphyseal plates, producing an appearance akin to that seen in Scheuermann's vertebral epiphysitis.

The younger child differs from the elder. The platyspondylia, wedging and disk expansion are all present, but owing to the fact that the epiphyseal plates have not yet commenced to ossify, the outlines of the bodies are clearly and sharply defined. Whether the wedging of the body is anterior or posterior depends on the weight distribution. In the dorsal region the narrowing is anterior; in the lumbar region, posterior. There is a mild kyphosis and scoliosis in the lower dorsal region.

All preceding observers have noted these striking spinal appearances. Though differing in minor particulars in several series, they may be said to form a characteristic feature of familial osteochondro-dystrophy.

Pelvis and Hip Joint.—The mother's pelvis, on the standard P.A. film, bears some superficial resemblance to that of achondroplasia. Though no accurate X ray pelvimetry was carried out in this case, the uneventful obstretric history makes it very unlikely that there is a greatly contracted true conjugate, which is characteristic of achondroplasia and renders normal delivery impossible. The pelvic bones are irregular in contour. The femoral necks are short and thick, and there is bilateral *coxa vara*. There is lipping at the lower ends of each sacro-iliac joint.

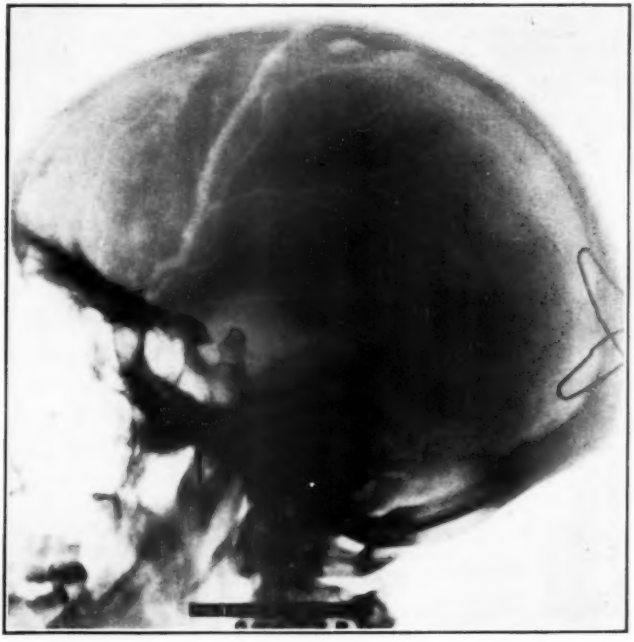

FIGURE XII. Mother's cranium, showing small *sella turcica* and heavy clinoid processes and *dorsum sellæ*.

The elder child shows gross bilateral *coxa vara*, with thickening of the femoral necks. The acetabula are large and irregular. The joint spaces are widened. The femoral heads are well developed, but the epiphyseal lines are very irregular, with grossly imperfect ossification in the metaphysis. There is irregular ossification of the epiphysis for the great trochanters, and also in the metaphyses around their epiphyseal lines.

The younger child shows appearances similar to the above, though there is non-development of ossification in the lateral half of the epiphysis for the left femoral head. This shows a resemblance, though purely a superficial one, to Perthes's disease. There is a slight upward subluxation of the femur on this side.

Hip changes have been noted in the cases of this condition previously described, and, like the spinal changes, form a characteristic feature of the disease.

Knee Joints.—The mother shows marked bilateral changes involving the tibia, femur and patella like those of osteoarthritis. There is lipping, irregularity and eburnation of the articular surfaces and ossification in the patellar tendon at its insertion.

In the elder child no abnormity of the knee joints is seen.

The younger shows nothing abnormal, beyond a slight widening at the inner aspect of both the tibial and femoral epiphyseal lines. There are numerous transverse striæ in the lower femoral metaphysis and in the upper and lower tibial metaphyses. The tibiæ show outward bowing about the middle.

The radiological changes are shown in the accompanying illustrations.

Comment.

Regarded from a clinical standpoint, the notable features in each of the three cases examined are, in addition to the familial and hereditary elements: (i) spinal kyphosis; (ii) limitation of hip movements akin to the limitation associated with Perthes's disease and to a lesser extent with *coxa vara*; (iii) short stature, not amounting to true dwarfism. Röntgenologically there are generalized osseous dystrophic changes particularly marked in the spine and the hips.

Morquio,[1] in 1929, was the first to describe cases of familial generalized osseous dystrophy, and since then Ruggles,[2] Brailsford[3] and Dale[4] have described similar cases, though they differ in various details. In Morquio's original series four children were affected in a family of five.

Morquio's disease has no resemblance, other than shortness of stature, to achondroplasia, thought Dale, while stressing its difference from achondroplasia, suggests that it is a condition midway between achondroplasia and the local malacias such as Perthes's disease or Scheuermann's disease. To us, the resemblance to the latter group might be maintained, but not to achondroplasia, from which the clinical and radiological findings are so dissimilar.

Clinically, the hip features in our cases are similar to those of Perthes's disease, and in the various joints examined the variation in the clinical findings as regards limitation of movement, adductor spasm *et cetera*, was only what would be expected in a number of joints of the Perthes type. Radiologically also there is some slight similarity to Perthes's disease.

The shortness of stature in our cases is demonstrably in no sense due to shortness of the length of the long bones, but rather to shortening of the trunk, the shortening being in part due to the kyphotic deformity, but a more important factor is the platyspondylia which forms a striking feature of the X ray films and which produces a general shortening of the trunk. No true dwarfism is present in our cases.

In achondroplasia the brain is crowded upwards and forwards and a minor degree of hydrocephalus is not unusually present. The nasal bridge is constantly depressed. Skull development in achondroplasia is distorted by the early ossification of the tribasilar bone and the generally deficient ossification in bone developed from cartilage. In our cases the skulls, with the exception of the *sellæ turcicæ*, are normal. Distorted pelvic ossification in achondroplasia makes normal child-bearing difficult or impossible. Here there was no such difficulty.

The arrested enchondral ossification in the long bones of the achondroplasiac gives rise to the trident hands and short limbs, while the spine is relatively little affected. The achondroplastic dwarf was recognized by the ancient Egyptians, and most of the old court jesters were of this type. True dwarfism is a *sine qua non* of achondroplasia consequent on the deficient length of the long bones. Further, though achondroplasia is sometimes hereditary, no familial tendency has been demonstrated. We feel that there is little justification for regarding the two conditions as in any way related. Neither is there any relationship between this condition and that of diaphyseal aclasis or of Ollier's disease.

The ætiology of Morquio's disease is unknown: the small *sellæ turcicæ* might point to the incrimination of the pituitary gland, as Dale has suggested, but in our series there were none of the usual clinical manifestations of pituitary dysfunction.

Acknowledgement.

Our thanks are due to Dr. Roy Sear, of Sydney, for his interest and help in the radiology of these cases.

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ACCESSORY PANCREAS CAUSING INTUSSUSCEPTION.

By KEITH ROSS,
Brisbane Hospital.

MANY cases of accessory pancreas have now been recorded, and in diverse situations. Though the most common site appears to be in the wall of the jejunum, they have been found in the stomach, duodenum, ileum, diverticulæ of these organs, gall bladder, umbilical fistula, mesenteric and omental fat and spleen. Such accessory pancreases usually are small, rarely more than one centimetre in diameter, and single, though double nodules have been recorded. They may consist of all the elements of normal pancreas, acini, islands of Langerhans and ducts, and when situated in the wall of the intestine the ducts may open into its lumen (Cameron,(1) Moore(2)).

The origin of these nodules is debated. Moore reviews the various theories, and concludes:

> From this review our conclusion must be that in different cases different factors operate: in some, inflammatory or embryonal adhesions with subsequent detachments of a mass of pancreatic cells; in others, development from the primary anlage of Zenker or Glinski, or the the secondary snared off anlage of Warthin, with the added conception that the cells of these anlage are still undifferentiated entoderm and capable of differentiating into pancreatic acini, islands of Langerhans, ductal epithelium and glands of Brunner. We are unable to accept any theory of heteroplasia, neoplasm or atavistic phenomena.

Various pathological changes may occur within the pancreatic nodule or in association with it, to wit: acute and chronic inflammation, fat necrosis, carcinoma, diverticulæ, pyloric stenosis, intussusception and intestinal obstruction. The only case with intussusception recorded prior to the one below is Benjamin's.(3)

Case Report.

R.R., a mentally deficient girl, aged fifteen years, was admitted to the Brisbane Hospital on March 7, 1931, with a five days' history of acute abdominal pain.

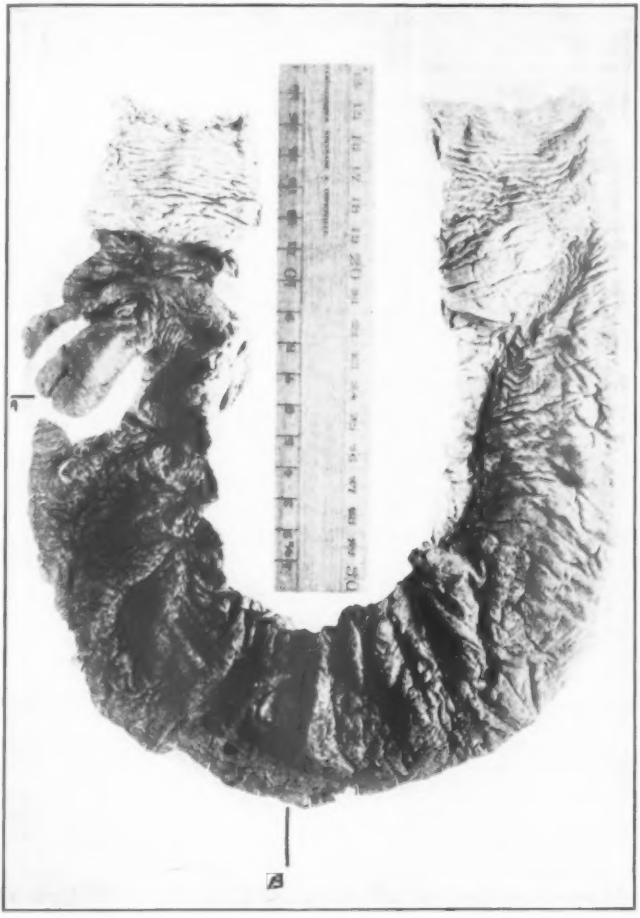

FIGURE I. Showing resected portion of bowel. A = Pedunculated adenoma (lying on a swab). B = Apex of intussusception; shallow oval ulcer at this site.

The pain was localized to the centre of the abdomen, was colicky in nature and had partial remissions. Vomiting, which commenced soon after the onset of the pain, was fæculent at the time of admission. Constipation was absolute, no fæces or flatus having been passed since the first day of the illness.

The general condition of the patient was poor; the abdomen was distended, and a rounded tense mass could be felt between the umbilicus and the pubis. An enema was returned stained with blood. A diagnosis of intussusception was made by the examining House Surgeon, Dr. E. L. Walker.

Immediate laparotomy, under ether anæsthesia, revealed an intussusception of the small intestine near its middle portion. Reduction was first effected, and then resection and end-to-end anastomosis were performed, for not only was a portion of the bowel of doubtful viability, but also a tumour was felt within its lumen. Saline solution was administered intravenously and intraperitoneally. Convalescence was uneventful, except that on the twelfth day mild uræmic

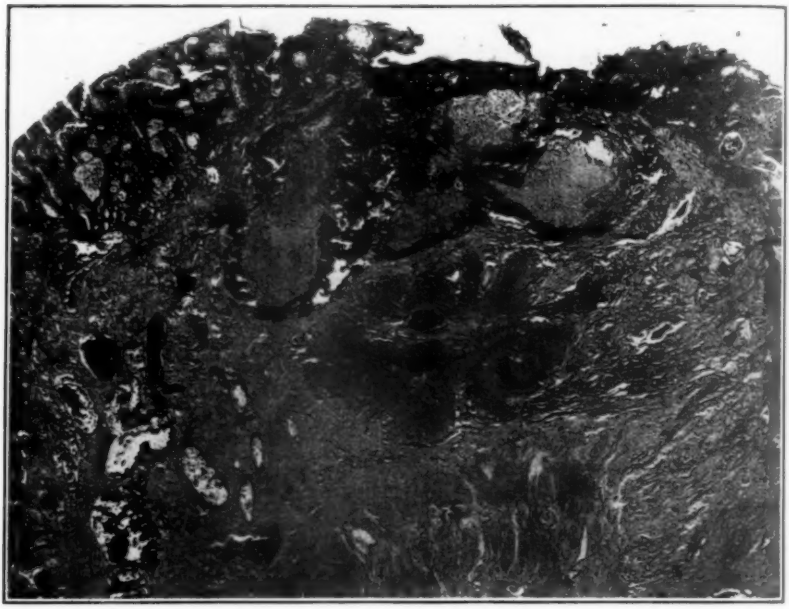

FIGURE II. Pancreatic adenoma lying beneath *muscularis mucosæ* of jejunum and with mucoid degeneration of superficial portion of adenoma.

symptoms developed, the blood urea rising to 109 milligrammes per cubic centimetre of blood. This disturbance soon subsided, and the patient was discharged twenty-eight days after admission. The Wassermann reaction was strongly positive. While the patient was still in hospital it was not suspected that the tumour was a pancreatic adenoma, but two months later, when she could first be persuaded to attend again, she gave a perfectly normal response to a glucose tolerance test.

Report on Nature of Tumour.

The following report on the tumour has been made by Dr. J. V. Duhig:

The tumour is of considerable pathological interest. It differs from the usual adenoma of the bowel in two particulars: the depth of its situation relative to the mucosa, and its complete independence of that structure. The benign adeno-

matous polypi of the bowel are usually superficially situated, and in their structure betray an obvious origin from the epithelium of the gut. This tumour is situated below the *muscularis mucosæ*, and, though it possesses no well defined capsule, the connective tissue matrix shows no evidence of infiltration, and so deep is the situation of the growth, and so dissimilar in structure from the mucosa, that I have assumed that no connexion exists between the two.

Cytologically the growth is quiescent, lacks invasive power, and it is most probably an adenoma. But it is an adenoma of an unusual type; it is not tubular in structure, and it shows no ducts. On cytological grounds one would judge it unlikely to have arisen in the mucosa from cylindrical epithelium, unless in the course of its evolution it had undergone advanced anaplasia. However, the obviously benign character of the growth is against that. I have come to the

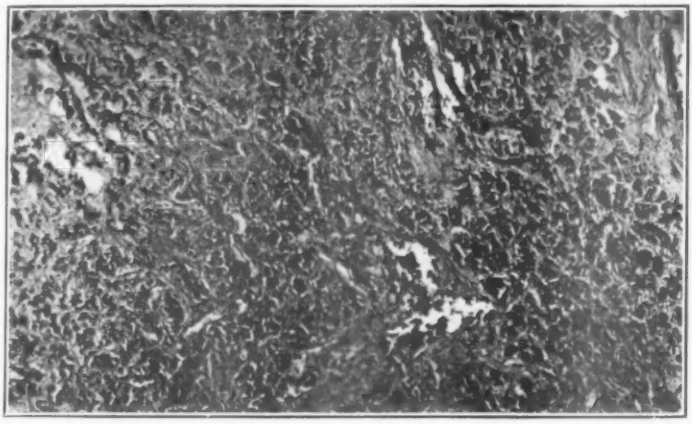

FIGURE III. High power view of adenoma.

conclusion that the growth must be derived from a rest of some "solid" secreting organ. It strongly resembles an adenoma of the pancreas with poor differentiation into the various component parts of that tissue. Many groups of cells are very reminiscent of those found in the islands of Langerhans, while others resemble acinar cells.

Thus I am strongly inclined, strictly on morphological grounds, to believe this growth is a pancreatic adenoma. Unfortunately, the preliminary fixation did not allow us to apply Bensley's method of specific differentiation.

The pancreatic tissue forms a very small part of the polypus, which is comprised for the most part of connective tissue. Microscopic examination of the proximal end of the excised gut reveals the characteristics of jejunum, of the distal end, ileum.

Comment.

If this view, that the tumour is an adenoma of the pancreas with many potential island cells, be accepted, the interesting point arises as to whether this tissue functioned. In many of the recorded cases of accessory pancreas islands tissue has been present, but there is no record of any disturbance of sugar metabolism. In this case there was no evidence of any disturbance, but it was not looked for when it was most likely to have been present. In 1927 Wilder and others[4] recorded a case of hypoglycæmia in association with a tumour of the islands

of Langerhans, and since then several others have appeared in the literature and have recently been collected by Smith and Siebel.[5] Thus it is worthy of note that, though a comparatively small adenoma of the islands of Langerhans within the pancreas may have a profound effect on sugar metabolism, there is as yet no evidence that island cells in aberrant situations have any.

Mechanism of Intussusception.

The traditional view of the mechanism of intussusception in the presence of a tumour is that the tumour is grasped and forced along the bowel by peristaltic movements, the tumour thus forming the apex of the intussusceptum. Figure I displays the gut resected in this case with the tumour, a pedunculated polypus, lying some sixteen centimetres proximal to the apex of the intussusceptum. A similar condition was found in a case of intussusception previously reported by the writer.[4] Thus it is apparent that the traditional explanation of the mechanism is not always the correct one. Wardill[7] pointed this out in 1925, and went so far as to say that probably it is not the correct one in the majority of cases. His explanation is that "the tumour, lying within the lumen of the bowel, acts as a foreign body and produces spasmodic contraction of the gut around it, with inhibition of that part immediately distal. The conditions are now favourable for that act of peristaltic gymnastics whereby the contracted part is induced to slip into the dilated portion." This view appears to be substantially correct, but presupposes that the area of spasm may extend over an appreciable length of gut, for in my first case the tumour lay some thirty centimetres proximal to the apex of the intussusceptum. Moreover, Wardill reports a case in which the tumour did not even enter into the intussusception, but lay within the bowel proximal to it. Perhaps it is better merely to surmise that a tumour in the gut may initiate irregular spasms and peristalsis in its vicinity, while either the tumour itself, or one of the areas of spasm may form the starting point of the intussusception. It should be pointed out, moreover, that this theory of spasm fails to explain why a tumour is so much more efficacious in initiating an intussusception than, say, a large gall stone which surely excites violent peristalsis before completely obstructing the intestine. Where a tumour anchored to the wall of the gut forms the apex the mechanism is apparently obvious, but in other cases there must be some factor as yet undiscovered.

Summary.

1. A case, the second in the literature, of an accessory pancreas causing intussusception is recorded.

2. Accessory pancreases are briefly described.

3. The mechanism of intussusception is discussed.

Acknowledgements.

I wish to express my thanks to Dr. J. V. Duhig, Pathologist to the Brisbane Hospital, for the pathological report on the tumour, and to Professor H. R. Dew, University of Sydney, for his interest in the case and the microphotographs.

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SACRAL CHORDOMA.

By RUPERT A. WILLIS,
Pathologist to the Alfred Hospital, Melbourne;
Honorary Pathologist to the Austin Hospital.

[From the Baker Institute of Medical Research.]

RECENTLY Mr. E. T. Cato[1] reported the clinical history of a case of sacral chordoma which had been under observation at the Austin Hospital. The present note is to record the findings at autopsy performed by me on May 1, 1932.

Autopsy Findings.

The body was that of a middle-aged male with pronounced emaciation, cellulitis of the scrotum, a necrotic ragged wound over the middle of the sacral area, with deficiency of the subjacent bone, and a large smooth rounded mass in the right buttock non-adherent to the skin.

Save for a moderate degree of pulmonary congestion, all thoracic organs were normal, as were also the cervical viscera and intracranial contents.

From the abdominal aspect the sacral tumour appeared as a hemispherical mass twelve centimetres in diameter, projecting into and largely occupying the true pelvis, and smoothly encapsulated by intact peritoneum on its anterior aspect. The rectum and bladder were crowded anteriorly and to the left. On dissection it was found that the tumour had largely destroyed and replaced the lower four segments of the sacrum, which were represented only by loose fragments of friable bone embedded in tumour tissue. The upper sacral segment was intact, as were also the pelvic bones, lumbar vertebræ and femora. The sacral mass was continuous with the ulcerated post-sacral lesion, and through the right ischiac notch with the buttock mass also. The tumour tissue was gelatinous and extensively necrotic. Both kidneys were the seat of extreme suppurative pyelonephritis, and the bladder was highly inflamed and filled with purulent urine. The liver was large, pale and fatty, and presented three small gelatinous tumours, one two millimetres in diameter situated subcapsularly on the anterior surface of the right lobe, and the other two respectively five millimetres and one centimetre in diameter situated in the substance of the left lobe. All other abdominal organs were substantially normal, and no tumours were discovered in any other situations.

The causes of death were recorded as (i) sacral chordoma, (ii) bilateral pyelonephritis and renal inadequacy.

Microscopical Findings.

Sections from several parts of the main growth and from the hepatic nodules were stained by hæmatoxylin and eosin, and by several methods for mucin and for glycogen. The structure of the growths was essentially similar to that already described in Mr. Cato's account, and need not therefore be repeated here.

The tumours in the liver were of the same nature as the sacral mass. Extracellular mucin was abundant in all sections examined, but the intracellular vacuoles of the physaliphorous cells failed to stain for mucin. No glycogen could be demonstrated in any of the growths.

Comment.

The case requires but little comment. It is one of unequivocal sacral chordoma, quite typical both as to clinical course and naked-eye and microscopic characters. The presence of hepatic metastases is worthy of note. In an earlier paper[2] I have described a previous case of sacral chordoma in which very widespread metastasis occurred, and have reviewed the literature on this subject. Metastasis from chordomata is decidedly unusual, and it is remarkable that, in both of the cases of this disease which I have studied at autopsy, blood-borne secondary growths have been present.

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All articles submitted for publication in this journal must be typewritten and double or treble spacing should be used. Each article should conclude with a brief summary and statement of conclusions. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without any abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal together with that of the journal in which the abstract has appeared, should be given, with full date in each instance.

When illustrations are required, good photographic prints on glossy gaslight paper should be submitted. Line drawings, charts, graphs and so forth should be drawn on thick white paper in India ink. Authors who are not accustomed to prepare drawings of this kind, are invited to seek the advice of the Editor if they are in any doubt as to the correct procedure. Skiagrams can be reproduced satisfactorily only if good prints or negatives are available.

VOL. III. JULY, 1933. No. 1.

POST-GRADUATE EDUCATION AS A FUNCTION OF HOSPITALS.

THE primary function of a hospital is the relief of the sick and injured. All people, professional and lay, are agreed on that point. The welfare of the patient must be our first consideration. Every case must be studied individually that a diagnosis may be made and appropriate treatment planned. Every case thus becomes a unit of medical or surgical knowledge, maybe a unit of medical or surgical progress; and thus there comes into play another function of the hospital vitally important for the well-being of the whole community, namely the educational function.

It is generally recognized that hospitals are necessary for the training of nurses, medical students and house surgeons, but it is not equally recognized that they are essential for the further education of practitioners, particularly surgeons in a later stage of their career.

With very few exceptions, the man who jumps into a busy surgical practice without going through the mill of post-graduate hospital service is a poor surgeon from the professional point of view. Too often his reputation is a jerry-built construction flimsily founded on a few

dramatic successes. The only reliable pathway to true surgical efficiency goes through the hospital, and it should be a broad and well-trodden pathway, wide enough to give passage to an adequate number of suitable practitioners earnestly desirous of preparing themselves for surgical service to the community.

Most of our large hospitals are organized on a visiting staff basis, which permits the full use of the post-graduate educative function. There are some hospitals, however, which bar their doors against outside practitioners, and give a monopoly of the large surgical experience available to one man, usually the medical superintendent. Striking examples of this education-hampering policy are to be found in New Zealand in some of the large public hospitals, where the boards of management are wedded to the one-man system and vigorously oppose the suggestion that they should adopt the visiting staff plan. They claim that under their scheme of staffing the patients are always treated skilfully and kindly by the man of their own choice, a man in whom the patients and the public have full confidence. They also claim that the hospital is run perhaps more economically, and certainly more smoothly than is possible with a visiting staff.

Hospital boards of management allege, and not altogether without reason, that we doctors are not an easy team to handle, that we are prone to bicker and differ amongst ourselves and with the medical superintendent, and with the hospital board, and that sometimes we are slack or even neglectful of our hospital duties, making them secondary to our interests in private practice. This attitude of dissatisfaction with the visiting staff system on the part of certain important hospital boards should be an incentive to our College to study the problem with due regard to what is in the mind of the laity. We must try to correct the layman fallacies and misunderstandings, but we must not be blind to realize that he is concerned equally with the medical profession in the supply of an adequate number of capable and conscientious surgeons to serve the needs of the whole community. He will also realize that only through hospitals can the supply be met. At the same time we must not be blind to our own faults and failings, and we must take care that the visiting staff system we advocate is organized as to give no reasonable grounds for hostile criticism.

A series of appropriate rules or by-laws should be adopted for the organization and conduct of a visiting staff, and every member should conscientiously abide by those rules or forfeit the privilege of a place in the team.

L. E. BARNETT.

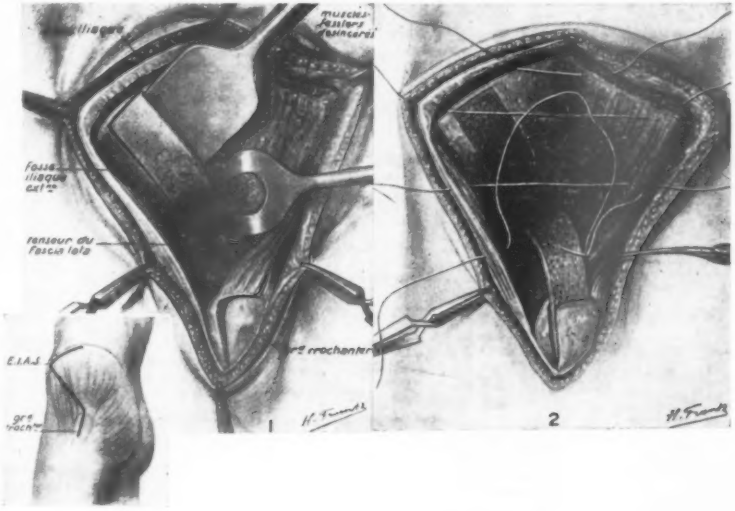
Surgery in Other Countries.

[In this column will be published short résumés of articles likely to be of practical value from Journals published in other countries and not readily accessible to surgeons in Australia and New Zealand.]

Operative Fixation of the Hip Joint Affected by Tuberculosis.

Andre Richard and A. Elbim *(Hôpital de Paris), Journal de Chirurgie*, Volume xxxix, January, 1932, page 1.

Richard and Elbim discuss the operative fixation of the hip joint affected by tuberculosis under the following headings: (i) The progressive stage in adults, (ii) the progressive stage in children, (iii) sequelæ in cured cases, (iv) sequelæ in cases of delayed healing.

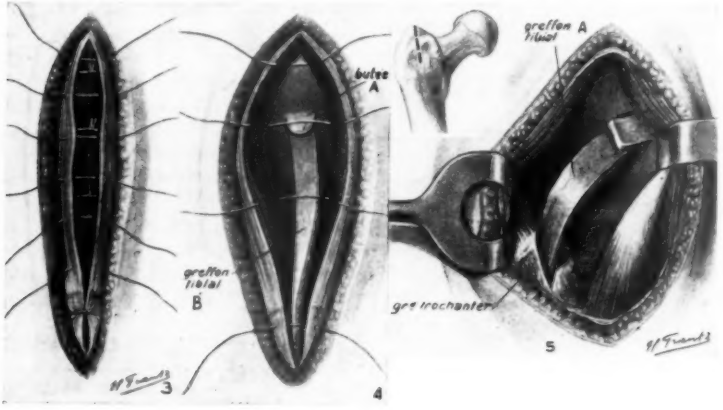


Progressive Stage in Adults.—There is little or no hope of cure with conservative treatment. Complete resection is impossible. Bony ankylosis is the best and safest end result, and, therefore, should be aimed at by operation at the earliest possible moment. Much time is thus saved, and undesirable sequelæ are avoided. Operative interference is contraindicated when there are other important foci of tuberculous infection in the body, or when any serious systemic disease is present. Usually a period of conservative treatment is advisable, but in some cases this fails to check the evolution of the disease, and operation should then be undertaken forthwith, even though there be disease in the acetabulum and femoral neck. In all cases, the operation should be planned so

as to avoid opening into diseased tissues. As a rule, the use of a pedunculated iliac bone flap, turned down and inserted into the great trochanter, is the operation of choice, as fixation ensues quickly and surely. When, however, the disease is such as to interfere with the cutting and placing of such a flap, a free tibial graft is used; this graft is so placed as to avoid the abscess. Free grafts undergo a good deal of absorption, and fixation is delayed for many months.

Progressive Stage in Children.—Cure frequently results from conservative measures, so that operation is not often indicated. When healing is delayed for more than three to four years, or when recurrence takes place after apparent cure, or when the disease progresses rapidly in spite of treatment, operation should be undertaken, provided that the child is not under seven years of age. If possible, a pedunculated iliac flap (drawbridge graft) should be used, otherwise a free tibial graft.

Sequelæ in Cured Cases.—Incomplete ankylosis with instability, pain, deformity, offers a wide field for operative fixation. This should not be undertaken in children less than eight years old. Usually an iliac flap is used, with or without



excision of the joint surfaces. As infection is absent, an iliac flap can always be obtained.

Sequelæ in Cases of Delayed Healing.—This group comprises the *coxalgies attardées* of Ménard. Bone repair is defective. A drawbridge graft stimulates bone formation, and is the operation of choice.

Technique of Operations.—Pedunculated Iliac Graft (Drawbridge Graft): The pedunculated iliac graft is used in all cases unless there is an abscess, which would interfere with healing. A bone flap, hinged at its lower end and consisting of one-half the thickness of the wing of the ilium with its periosteum intact, is bent over and inserted into a sagittal cleft in the great trochanter (Figures 1 and 2). The approach is shown in Figure 1, the gluteal muscles being reflected from the ilium by cutting and the periosteum being left intact.

Free Tibial Graft—Lateral Approach: A straight vertical incision exposes the iliac wing, and the great trochanter, which is split in a coronal plane. A trapdoor is raised in the iliac wing. The placing of a flat tibial graft is explained by Figures 3 and 4.

Free Tibial Graft—Anterior Approach: When there is an abscess placed laterally so as to preclude the performance of the operations already mentioned.

a free graft is placed anteriorly, as shown in Figure 5. The approach is between the sartorius and the *tensor fasciæ lata*.

All operations are conducted with the patient on an orthopædic lath, and at the termination a plaster is applied. This is retained for some months, and then replaced by a short plaster, permitting movement of the knee. In conclusion, short reports of numerous cases are appended.

Whilst there is no doubt that better end results are obtained in tuberculosis of the hip joint when ankylosis is brought about by means of a well planned operation in selected cases, it would appear that the authors advise interference much more freely than many surgeons would consider advisable. They rather belittle the risks of operating even in the acute stages of the disease. A graft placed as advised is not well fitted to resist the forces tending to bring about adduction, should destruction of the head and acetabulum continue.

HUGH TRUMBLE.

USE OF THE WINGED NAIL IN THE SURGERY OF BONE.

Josef Wolf, Orthopædic Department, St. Anna Stiftes, Ludwigshafen, *Der Chirurg*, Volume v, March 1, 1933, page 170.

JOSEF WOLF discusses the use of the winged nail in the surgery of bone. In the operative treatment of fractures, the use of bulky screws, which remain permanently *in situ*, has the advantage that the continued presence of such a foreign body may cause infection. The Steinmann's pin, which was used for extension of fractures, was supplanted by the Kirschner wire extension, because this left such a small defect in the bone and produced so little injury to the soft parts. Wolf uses a fine nail for fixing fractures which have either been replaced by

leverage or have been drawn into position by the Kirschner wire extension. He regards its use as an advance and auxiliary to the use of the Kirschner wire extension. The nail is channelled, has not much substance, and is somewhat similar in shape to the Smith-Petersen nail. The winged shape enables the surgeon to coapt fractures with firmness and stability. It is therefore useful in those fractures in which lever action of a long fragment is liable to displace the smaller fragment. Moreover, this nail has the advantage that, as it is not circular, it can prevent torsion of the fragments on one another. It is therefore particularly useful when a slightly rotating small fragment has to be fixed on a

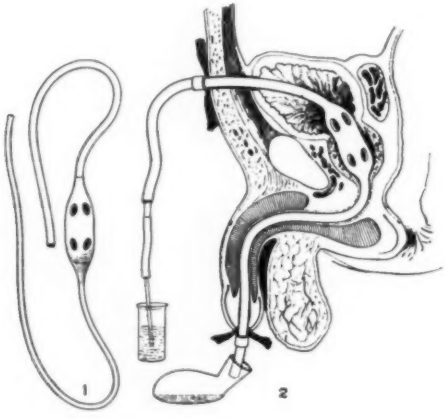
large one. The accompanying figure shows an olecranon fracture which has been nailed in this way.

H. B. DEVINE.

SIMPLE AFTER-TREATMENT FOR SUPRAPUBIC PROSTATECTOMY.

H. Gangl, *Archiv für Klinische Chirurgie,* Volume CLXIX, 1932, page 408; abstracted in *Der Chirurg,* July, 1932.

GANGL describes a simple after-treatment for suprapubic prostatectomy. Instead of the usual method of drainage after suprapubic prostatectomy, the author uses a tubular system of drainage, which is illustrated in Figures 1 and 2. The apparatus is made in one piece, and consists of a small tube for the urethra, and a larger tube for the abdominal wound. These tubes are connected by a short wide piece, which tapers at each end and is provided with holes; it is designed to fit into the prostatic bed. After the prostate has been dissected out,



the cavity is packed with stryphon gauze for a few minutes until the bleeding is controlled. A sound is then passed through the penis into the bladder, and the smaller tube is fastened to it with thread. The whole tube is now drawn down until the ampulla-like part of the tube is pressed firmly into the prostatic bed, so that it acts as a tamponade. The other end—the larger tube—is led through the wound into the abdominal wall. The bladder can then be washed out in either direction; that is, from the penis or from the abdominal wound. The apparatus also permits the prostatic wound to be constantly irrigated. On the seventh day this apparatus is removed, a retention catheter is passed through the urethra into the bladder, and a small drain is placed in the abdominal wound for a further four days.

H. B. DEVINE.

Reviews.

THORACIC SURGERY.

Surgery of the Chest. By GEORGE F. STRAUB, M.D., F.A.C.S., 1932. Baltimore, Maryland: Charles C. Thomas. London: Baillière, Tindall & Cox. Pp. 475, with illustrations. Price in England: 57s.

As a change from the usual textbook, monograph or article in a journal, it is refreshing, now and then, to find a book which does not purport to be an authoritative exposition, but which is, in reality, a pleasantly written survey of what has happened in a particular branch of surgery during the past twenty years, what is happening at present and what may be hoped for in the near future. To avoid statistical tables and to avoid very largely personal opinions of the merits or demerits of the various methods of attempts to achieve the same ends, but merely to set out these methods for the consideration of those who are interested, and at the same time to add a little here and a little there, in a very practical way, is an achievement only too rare in these days; and Dr. George F. Straub is to be congratulated on the production of his book on surgery of the chest.

In the preface the author points out that nobody should "attempt to enter the difficult field of thoracic surgery" who has not a thorough understanding of the anatomical and physiological facts underlying this work. With this statement there will be general agreement, but to it should perhaps be added the demand for an appreciation of the pathological changes of the organs and tissues of this region. At the same time, the necessity does exist for bringing before the medical profession the possibilities which chest surgery now presents. The author has availed himself of the help of Dr. H. L. Arnold, who has written two chapters on the physiology of respiration and the pathological physiology of the thorax respectively. These are brief, and not very satisfactory. Dr. Arnold is also responsible for the chapters on the rôle of X rays in thoracic surgery and on therapeutic pneumothorax. He very rightly points out that, whereas flat plates are adequate for most of the work, stereoscopic plates are essential where localization is of moment, that flat plates taken at a distance of several feet are advisable because of the distortion produced by nearer tube distances, that fluoroscopy is a necessary adjunct as it is the only satisfactory method of determining mediastinal mobility, and that the bronchoscopic introduction of contrast media is, in the long run, the most satisfactory method. The chapter on therapeutic pneumothorax is very full and practical.

The rest of the book is devoted to a survey of the operative procedures for various diseases of the chest wall and the thoracic contents. An extensive bibliography is appended—British, Continental and American—and in this way the author fulfills excellently his purpose of bringing to notice in an interesting and concise manner the possibilities of the various aspects of chest surgery. The illustrations throughout are very good, being for the most part either photographs of the author's apparatus and patients or his own well executed sketches. His method of exposure of the posterior part of the thorax by splitting muscles rather than by cutting them (page 168) is a distinct improvement on the usual incision, and throughout the book there are numerous practical suggestions made as a result of the author's experience.

It is of interest to note that the author performs his own endoscopic examinations. Those in this country who are hopeful of the development of chest surgery will agree upon the necessity for the closest cooperation of the physician skilled in the interpretation of chest signs, the radiologist who appreciates the require-

ments of the surgeon, the endoscopist who can do what is necessary without causing the patient undue distress, and the surgeon who possesses the requisite physiological, anatomical and pathological knowledge of the diseases of the chest which he is called upon to treat. The restricted scope of this work in this country at present necessitates such cooperation and prohibits the assumption by one individual of all these activities.

The book has been printed carefully, and there are very few misprints. Notable omissions from the bibliography are the names of Dévé and Dew in connexion with hydatid disease of the lung. These are to be regretted because the book is intended to be a review of modern work, and in most other respects the bibliography is very satisfactory. The price (in England it is 57s.) must militate against a large sale in Australia. But those who read it cannot help but share the enthusiasm which actuated its author.

Proceedings of the Royal Australasian College of Surgeons

REPORT OF COUNCIL.

THE report of the Council of the Royal Australasian College of Surgeons was submitted to the Fellows at the annual business meeting held in Sydney on April 11, 1933. The more important matters contained in the report are published below.

Election for the Council.

The following were were elected members of the Council: Sir Louis Barnett, H. B. Devine, Alan Newton, H. R. G. Poate, R. B. Wade.

Visit of the President to Great Britain.

The President of the College, Sir Henry Newland, left for England shortly after the last annual general meeting, and the Council wishes to record its great appreciation of the valuable work he has done for the College both in England and in Scotland. On April 14, 1932, the President attended a meeting of the Council of the Royal College of Surgeons of England, and, after an introductory speech, presented the following address from the Royal Australasian College of Surgeons:

> The President and Council of the Royal Australasian College of Surgeons have gratefully received from Mr. C. H. Fagge the message conveying the sympathy and goodwill of the President and Council of the Royal College of Surgeons of England.
>
> This message and the visit to Australia of Mr. C. H. Fagge will encourage the Fellows of the Royal Australasian College of Surgeons in their endeavours to advance the science and art of surgery for the common weal.
>
> The interest and friendship evinced by the Royal College of Surgeons of England in the foundation and development of the Royal Australasian College of Surgeons will strengthen the feelings of brotherly goodwill in our profession throughout the Empire.
>
> H. S. NEWLAND, President.
> R. HAMILTON RUSSELL, Censor-in-Chief.
> ALAN NEWTON, Honorary Secretary.

The Lord President of the Royal College of Surgeons of England, in his reply, alluded in the most sympathetic way to the Royal Australasian College

of Surgeons, and begged the President to convey to the Council in Australia the warmest greetings and good wishes of the Council of the English College.

The President represented the College at the centenary meeting of the British Medical Association.

Permanent Headquarters of the College.

The Council authorized the Executive Committee to issue an appeal to all Fellows of the College for contributions to a building fund. This appeal, in which the whole position was explained, has, up to date, resulted in the payment or promise of contributions amounting to £4,300. The College has at its disposal a sum of money representing partly savings from its income and partly contributions to a general endowment fund, which, with the contributions already in hand, will insure the permanency of the project. It is hoped, however, that an additional £2,000 will still be forthcoming as a result of the appeal, in order to enable the building to be finished free of debt.

The centenary of Melbourne will be celebrated during 1935, and it is hoped to arrange for the building to be opened in this year. It is believed that a number of prominent surgeons from abroad would attend the ceremony.

Alterations in the Articles of Association.

Notices of proposed alterations in the Articles of Association of the College have been circulated to all Fellows, and are to be considered by them at the forthcoming annual general meeting. These alterations have been submitted to the Honorary Solicitor of the College and have received his approval. Their purpose may be considered under the following headings:

(*a*) Future admission of fellows. The defects of the present system of application for fellowship have, for some time, been obvious to members of the Council, and may be summarized as follows:

1. It is impossible to insure that a similar standard is maintained in all the States and the Dominion.

2. It is difficult to estimate the professional capacity of a candidate by perusal of the written reports of the referees. In some cases these are filled up in a perfunctory manner and in others there is a suspicion that the opinion expressed is dictated more by the personal popularity of the candidate than by his surgical judgement and ability.

3. The system of nomination places Fellows, who are asked to act in this capacity by a candidate whom they consider is undesirable, in an invidious position.

4. As all applications are confidential and privileged, it is impossible to obtain the general opinion of Fellows about any prospective candidate.

5. The Censor-in-Chief reports that it is impossible to determine the merits of a candidate by examination of a series of case histories submitted by him.

Under the proposed system, Australian candidates must appear in person before an Australian Board of Censors, consisting of six Fellows resident in the Commonwealth of Australia, and New Zealand candidates must appear before a Dominion Board of Censors, consisting of six Fellows resident in the Dominion of New Zealand. All candidates must apply to the Censor-in-Chief for permission to appear before a Board of Censors and the Censor-in-Chief is empowered to decide whether this application shall be granted in any individual case. He will be guided by the amount of training which the candidate has undergone and if, in his opinion, this is inadequate, he will indicate to the candidate concerned the further training which he must undergo. Any candidate who is dissatisfied with the decision of the Censor-in-Chief may appeal to the Council.

The Boards of Censors will be empowered to subject each candidate to such tests of his knowledge and capacity as may seem desirable.

After approval by a Board of Censors, candidates must apply upon an approved form to the Council of the College for election to fellowship. The Council is empowered to review not only the professional knowledge of the candidate, but also his ethical standing, before determining whether he is worthy of election.

Under the proposed system it is believed that there will be a uniform standard of admission throughout Australia and New Zealand and, further, that the prestige of the College will be increased by the fact that its standard of admission will entail a thorough knowledge, on the part of the candidate, of the theory and practice of surgery.

(*b*) In order to obviate the difficulty of obtaining suitable representation from New Zealand at all Council meetings, it is proposed to amend Article of Association No. 11*a* in such a manner that an approved substitute may act for any member of the Council resident in New Zealand.

(*c*) Under the present Articles of Association it is impossible to elect to honorary fellowship of the College any individual who resides in Australia or New Zealand. It is proposed to alter Article of Association No. 23 in such a manner that honorary fellowship may be conferred upon residents of these countries, providing that they are not engaged in surgical practice.

The proposed new Articles of Association are as follows:

Proviso by way of addition to Article 11*a*.—"Provided always that a member of the Council resident in New Zealand may with the approval of the Council appoint any Fellow of the College approved by the Council to be his substitute to attend meetings of the Council held within Australia which such member resident in New Zealand is unable to attend and such appointment shall have effect and the appointee while he holds office as a substitute member shall be entitled to notice of meetings of the Council and in the absence of the member whose substitute he is to attend and vote thereat accordingly.

Article 14.—The words "and of such members of the Council as reside in the respective State or Dominion who shall be *ex officio* members of the Committee for that State or Dominion" shall be added at the end of Article 14.

Article 15.—The following article shall be substituted for Article 15: "15. The Council shall appoint a Board of Censors for the Commonwealth of Australia and a Board of Censors for the Dominion of New Zealand to inquire into and report to the Council upon the qualifications of candidates for fellowship of the College from persons resident in Australia or New Zealand respectively and to inquire into and report to the Council upon any other matter that may be referred to them by the Council and such Boards shall be constituted as follows: The Board of Censors for the Commonwealth of Australia shall consist of six Fellows resident in the Commonwealth of Australia and the Board of Censors for the Dominion of New Zealand shall consist of six Fellows resident in the Dominion of New Zealand."

Article 16.—In Article 16 the word "vigilance" appearing in the first line thereof shall be deleted and the word "ethics" substituted therefor.

Article 17.—The following article shall be substituted for Article 17: "17. All proceedings and reports of Boards of Censors and of Ethics Committees shall be confidential and privileged."

Article 18.—The following article shall be substituted for Article 18: "18. All candidates for fellowship of the College shall apply upon the form prescribed by regulation made by the Council to present themselves in person before a Board of Censors of the College. Such application shall be sent to and considered by the Censor-in-Chief of the College who after consultation if he thinks fit with the Board of Censors of the country in which the candidate resides shall decide whether the application shall be granted. Candidates rejected by the Censor-in-Chief may appeal against his decision to the Council of the College. Candidates approved by the Censor-in-Chief or by the Council upon appeal to it shall present themselves in person before a Board of Censors at such time and place as the Council may from time to time determine."

Article 19.—The following article shall be substituted for Article 19: "19. The Council shall from time to time by regulation prescribe the course of training which shall be undergone by all candidates for fellowship and the nature of the test to be made by each Board of Censors in order to satisfy itself as to the qualifications of the candidate."

Article 20.—The following article shall be substituted for Article 20: "20. The Boards of Censors shall make their reports and recommendations to the Censor-in-Chief who shall transmit them to the Council of the College."

Article 21.—The following article shall be substituted for Article 21: "21. A candidate approved by the Board of Censors may apply to the Council of the College for election as a Fellow. Such application shall be on such a form and contain such information as the Council may from time to time by regulation prescribe. Every application shall embody the following pledge, which shall be binding upon the candidate if admitted to fellowship:

> 'I hereby pledge myself as a condition of fellowship of the Royal Australasian College of Surgeons to practise surgery and to conduct my life in strict accordance with the Constitution of the College. I declare that I have read and agree to be bound by all Articles of Association and Regulations of the College now in force and also to be bound by any other Articles of Association or Regulations that may be adopted from time to time by the College or by its governing body or duly delegated authority. I declare that I will submit to any penalties including expulsion from the College that may be imposed by the College or the governing body for violation of any of its Articles of Association or regulations or of this pledge'.

and shall contain an agreement by the candidate that all communications made by the Council or any of the officers and all answers to any *questionnaire* made by any referee or any Fellow of the College shall be absolutely privileged and shall for all purposes be deemed a privileged communication."

Article 22.—The following article shall be substituted for Article 22: "22. The Council shall consider the application, the report and recommendation of the Board of Censors thereupon and all relevant materials and communications and may either admit the candidate to fellowship or reject his application or suspend final determination for any period it thinks fit or for further proof of the candidate's qualifications. The Council shall not be required to assign any reason for the admission or rejection of a candidate or suspension of its decision upon a candidate's application and the decision of the Council upon any application shall be final and conclusive and subject to no appeal. All proceedings in relation to the election for fellowship shall be confidential and privileged."

Article 23.—The following article shall be substituted for Article 23: "23. The Council may admit distinguished surgeons or scientists as Honorary Fellows of the College and make provision for their admission in such manner as it shall from time to time think fit. Provided that no surgeon practising in the Commonwealth of Australia or the Dominion of New Zealand shall be eligible for Honorary Fellowship."

Article 26.—After the words "guilty of" appearing in Article 26, the following words shall be inserted, "division of fees either directly or indirectly in any manner whatsoever or of other."

Primary Fellowship Examination.

It is hoped to repeat the Primary Fellowship Examination of the Royal College of Surgeons of England in Australia and also to hold a similar examination in New Zealand. The Council of the Royal College of Surgeons of England has expressed itself in favour of repeating the examination.

Syme Research Endowment.

The Council has adopted the following regulations:

1. In memory of the first President of the College, Sir George Adlington Syme, K.B.E., his widow and family transferred to the College a sum of £2,510 in Australian consolidated securities.
2. Portion of the interest on this sum, the amount to be determined annually by the Council, is to constitute an honorarium for an oration entitled the "George Adlington Syme Oration", which is to be delivered at each annual general meeting. The Syme orator shall be appointed by the Council of the College.

3. The remainder of the interest in each year may be devoted by the Council to the payment of a Syme research scholar. The Council shall appoint the Syme research scholar and shall indicate the research work which he must undertake, together with any conditions which it sees fit to impose. If, in any particular year, no appointment is made, the interest falling due in that year shall be dealt with in such manner as the Council may determine.

New Zealand Meeting.

The yearly meeting of the New Zealand Fellows was held in the rooms of the New Zealand Branch of the British Medical Association at Wellington on September 8, 1932. After discussion, the following resolution was carried:

That, in the opinion of the New Zealand Section of the Royal Australasian College of Surgeons, the surgical staffing of the so-called "closed" or "one-man" hospitals in certain of the larger centres, such as Invercargill, Ashburton, Hamilton and Gisborne, suffers from serious defects which lessen the efficiency of these institutions as compared with hospitals that have a properly organized visiting staff. The College, therefore, strongly advocates the adoption of the visiting staff system.

It was also resolved:

That this College approach the Director-General of Health with a view to assisting him in a reclassification and grading of hospitals and submitting an adequate system of surgical staffing, and that for this purpose a committee be appointed consisting of the present Hospital Committee with power to add to its number.

Hospital Committees.

K. C. Ross and Dr. B. W. Sears, representing the Queensland Hospital Committee, forwarded to the Executive Committee a valuable report on a system of filing, indexing and reporting medical records for use in public hospitals. This report has been handed to the Secretary of the Hospital Committee for the State of Victoria, Henry Searby, for the information of this Committee which is engaged on a similar task.

Gifts to the College.

A second donation of five guineas to the Endowment Fund has been received from J. P. S. Jamieson.

Mrs. Todd, widow of Dr. R. H. Todd, has presented some books containing the history of the Royal College of Surgeons of Ireland.

Professor F. Wood Jones, F.R.S., has presented a photograph of Sir James Palmer, who edited John Hunter's works.

Allan Grant, Esquire, has presented two volumes of Plarr's "Lives of the Fellows of the Royal College of Surgeons of England".

COUNCIL MEETING.

A COUNCIL meeting was held at the British Medical Association House, 135 Macquarie Street, Sydney, on Tuesday, April 11, 1933.

Election of Office-Bearers.

The following office-bearers were reelected:

President: Sir Henry Newland.
Vice-Presidents: Sir Louis Barnett, Sir Alexander MacCormick.
Censor-in-Chief: R. Hamilton Russell.
Honorary Secretary and Treasurer: Alan Newton.
Honorary Assistant Secretary: Julian Smith, Junior.

Appointment of Committees.

The Council appointed Fellows to act on the State and Dominion Committees as follows (members of Council are *ex officio* members of State Committees):

New South Wales: A. Aspinall, G. Bell, C. E. Corlette, B. T. Edye, Sir John McKelvey, Guy Antill Pockley, John Laidley.

New Zealand: H. T. D. Acland, Duncan Stout, Professor F. Gordon Bell, Sir Donald McGavin, Sir Carrick Robertson, D. S. Wylie.

Queensland: G. P. Dixon, J. Lockhart Gibson, J. C. Hemsley, A. V. Meehan, W. N. Robertson, Neville Sutton.

South Australia: A. M. Cudmore, I. B. Jose, H. M. Jay, L. C. E. Lindon, Bronte Smeaton, T. G. Wilson.

Tasmania: Clifford Craig, F. W. Fay, D. H. E. Lines.

Victoria: Victor Hurley, Fay Maclure, R. H. Morrison, J. Newman Morris, C. Gordon Shaw, John Shaw, B. T. Zwar.

Western Australia: F. J. Clark, H. B. Gill, D. D. Paton.

Hospital Problems in New Zealand.

The Vice-President, Sir Louis Barnett, explained to members of the Council the difficulties confronting Fellows in New Zealand in regard to the surgical staffing of hospitals in that country. He indicated the disadvantages of the so-called "one-man" hospitals in which one medical officer is in complete charge of the hospital and no honorary medical officers visit the institution.

The following recommendations, made by the Dominion Committee, for the organization of an honorary system of surgical staffing of the public hospitals of fifty beds or over in New Zealand, were approved by the Council:

1. There should be one surgeon and one assistant surgeon to each twenty-five to forty beds, the number varying with the particular circumstances of each individual hospital. In the larger hospitals it is necessary also to appoint surgeons and assistant surgeons to the special departments of surgery.

2. All appointments should be made by the Hospital Board, which should be guided by the advice of a special consultative body, or in the case of the smaller hospital districts by the advice of the Director-General of Health.

3. This special consultative body should include representatives of the consulting staff (if any) of the hospital and/or senior members of the medical profession of the district, selected by the Hospital Board, with the approval of the Director-General of Health.

4. The tenure of appointment should be for three years, but may be extended for subsequent terms of three years.

5. The age limit for active service on the surgical staff should be sixty, except under special circumstances.

6. To insure smooth running in the wards and theatres, the members of the visiting staff should make their ordinary visits as far as practicable on definitely arranged days in the week and at definite hours. Dangerously ill cases should be visited daily, and emergency calls should be responded to promptly.

7. An assistant surgeon should act generally as assistant to his senior in the operating theatre and in the wards. When in the opinion of his senior surgeon he is sufficiently experienced, he may be given higher responsibilities, such as the care of in-patients, and the performance of major operations.

8. As a general rule, consultations of two or more members of the hospital staff should be held in all cases of difficulty and chronicity.

9. It should be the duty of the surgeon or assistant surgeon to check the case records of the patients under his care, and see that these records contain all necessary information regarding diagnosis, treatment, progress and end results.

10. Meetings of the honorary staff, with the medical superintendent and registrars (if any) in attendance should be held at regular intervals (say, once a month) in order to review the staff work and discuss proposals for rendering that work more efficient. Details of all cases of death in hospital, *post mortem* records and infections arising in the hospital should be submitted for consideration and frank criticism. Alterations, additions and improvements generally in the accommodation and equipment should be recommended if thought desirable, and all other matters dealt with making for greater efficiency in the care of the sick. It should be the duty of all members of the honorary staff to attend these meetings regularly.

11. For the purpose of establishing useful liaison between the honorary staff and the board, it is recommended that at least one member of the honorary staff should attend the Hospital Committee meeting of the Board.

It was resolved:

That in the interests of the community and the surgical profession the "one-man" system be condemned.

It was resolved:

That the Council of the Royal Australasian College of Surgeons considers:

1. A public hospital should act as a training school and centre where medical practitioners can investigate disease in a scientific manner.

2. It is at a public hospital that all types of diseases are to be seen collected in large numbers, and it is here that increase of medical knowledge is to be gained.

3. The system of visiting medical officers, whether paid or honorary, should be perpetuated since:

(*a*) The medical practitioner gains knowledge by seeing large amounts of clinical material and by the supervision, advice, association and control of those senior to him.
(*b*) The in-patients receive better treatment by the consultations of groups of specially trained medical practitioners.
(*c*) The general public benefit by the experience gained by a large staff of visiting medical officers.
(*d*) The medical profession benefits by the dissemination of the knowledge gained by the staffs of hospitals.

Sir Louis Barnett informed the Council that the Dominion Committee had been approached by the Director-General of Health with a suggestion that it should undertake the task of grading the hospitals in New Zealand.

It was resolved:

That the Dominion Committee be asked to submit a report to the Council on methods of grading hospitals.

THE COLLEGE LIBRARY.

WHEN the College building is opened in 1934, a library will be available for the use of Fellows, and already a collection of classical and current surgical literature has been acquired, including a large number of journals which are now ready for binding. These journals are exchanges and donations, but some journals required by the College cannot be obtained by exchange, and at present, owing to the cost of building, the College cannot become a subscriber. The Committee, therefore, appeals to any Fellow who is a subscriber to one of the following

journals to communicate with the Librarian, G. R. A. Syme, 12 Collins Street, Melbourne, C.1.

The journals required are: *The Journal of the American Medical Association, Brain, Surgical Clinics of North America, Zentralblatt für Chirurgie, The Collected Papers of the Mayo Clinic.*

The following is a list of journals at present received by the College: *Archivio Italiano di Urologia, Southern Medicine and Surgery, New Zealand Medical Journal, The Journal of Obstetrics and Gynæcology of the British Empire, Northwest Medicine, The Journal of Bone and Joint Surgery, Journal of Thoracic Surgery, Clinical Medicine and Surgery, Canadian Journal of Medicine and Surgery, Western Journal of Surgery, Obstetrics and Gynecology, American Journal of Surgery, Bulletin de l'Académie de Médecine, American Journal of Cancer, The Annals of Surgery, Archives of Physical Therapy, X-Ray, Radium, Archives of Surgery, British Journal of Urology, British Journal of Ophthalmology, Bristol Medico-Chirurgical Journal, The British Medical Journal, The Canadian Medical Association Journal, The Edinburgh Medical Journal, Bulletin of the Johns Hopkins Hospital, Irish Journal of Medical Science, Acta Chirurgica Scandinavica, The Lancet, The Laryngoscope, Journal of Laryngology and Otology, The New England Journal of Medicine, The Practitioner, Radiology, Surgery, Gynecology and Obstetrics, Wiener Medizinische Wochenschrift, Journal de Chirurgie, Japanese Journal of Experimental Medicine, La Presse Médicale, Medical Press and Circular, The British Journal of Surgery, The Proceedings of the Royal Society of Medicine, The American Journal of the Medical Sciences, The Medical Journal of Australia, The British Journal of Radiology.*

Obituary.

ROBERT HAMILTON RUSSELL.

THE name of Hamilton Russell has long been eminent among the surgeons of this country. By his death, Australasia has lost a man whose active labours in the service of humanity have been attended by unusual consequences and a personality that might be correctly described as that of a great man, even greater than his works. He shed a lustre on Australasian surgery, and his name was known and honoured far beyond the shores of the sister Dominions of Australia and New Zealand. Every place in which the science and art of surgery are esteemed is the poorer for his passing.

Robert Hamilton Russell was born at Farningham, Kent, in 1860, and his education was started at Nassau School. In 1878, a boy fresh from school, he entered the Medical School of King's College, London. Having completed a course of dissection and attended lectures in anatomy and physiology, he found himself listening to lectures in clinical surgery delivered by the great Lister. His pupillage under Lister was in the days of the carbolic spray and gauze dressings. It was during this time that he learned from his master the art of dressing wounds, and all through his life never ceased to wonder at the extent and perfection of Lister's achievements as a "dresser". During the years 1883 and 1884 he was Lister's house surgeon. There can be few more striking examples of the influence exerted by supreme master over devoted pupil, and throughout his life he treasured the memories of his association with Lister as his most priceless possession. With whatever gifts Russell may have been graced by birth or fortune, he was for ever paying tribute to his illustrious master. In his presidential address to the Section of Surgery at the Australasian Medical Congress in 1914, he said: "One incidental but direct result of the teaching of Lister may be discovered in the circumstance of your having set me in this place. I myself am conscious that it is so, and I rejoice in the knowledge that whatever you have found of worthiness in me, I may ascribe to his influence, his teaching and his example; and in accepting the honour you have done me, I would offer it as the only tribute it is in my power to offer, to his beloved and honoured memory." Many surgeons of this generation, once Russell's devoted students, would pay homage to him in like manner.

In 1890, Hamilton Russell arrived in Melbourne and was registered on May 2 of that year. In 1892 he was appointed to the staff of the Children's Hospital, Melbourne. During the early years of this appointment, Russell was turning his mind to the study of inguinal hernia. In 1899, at the Intercolonial Medical Congress in Brisbane, he read his paper on the "Ætiology and Treatment of Inguinal Hernia in the Young", and this paper also appeared in *The Lancet* during the same year. He then stated as his view that acquired inguinal hernia in the young subject had probably no existence in fact, thus laying the foundation of the saccular theory of hernia. These views were questioned at the time by C. B. Lockwood, John Langton and later by E. M. Corner, and led Russell to restate his convictions many times subsequently both at home and abroad. His views have received widespread recognition and have, of course, lent themselves to very useful practical application. At about the same time, Russell became interested in the treatment of fractures, for he always deplored the use of the multitude of splints, then current, and he was for ever seeking simpler means. Particularly was he concerned with the usual employment of

"passive movement" and constantly urged its expulsion from the category of surgical measures. Whilst at the Children's Hospital, he employed a method of his own invention for the treatment of fractures of the femur, which became widely used by his former students and house surgeons. This method perhaps never gained general acceptance by surgeons, for there were few who possessed the forbearance and patience necessary for its use. To witness Russell's delicate, gentle handling of a fractured limb in a conscious apprehensive patient was a privilege, for there could be few more perfect manœuvres in surgery.

In 1901, being appointed to the staff of the Alfred Hospital, Russell was forced to retire from the Children's Hospital, which, however, he joined again for a further term of service on his retirement from the Alfred Hospital in 1920. It was at the Alfred Hospital that Russell exercised his profound influence on the minds of the younger graduates. His lofty ideals and his denial of self were reflected in his teaching. His teaching, like his work, was painstaking and methodical. To be trained by him was to be endowed with a love of the science of medicine for its own sake, and to be equipped with ability to practise its art.

Two of Russell's early cases are of historic interest. In 1903 he removed a shawl pin from the lower lobe of the lung by thoracotomy, and it is believed that this was the first case of its kind in surgical history. In 1907 he dealt with what is believed to be the first case in which complete closure of the abdomen was effected after evacuation of a putrid hydatid cyst.

In 1911 he suggested his "hypospadias operation" for the relief of very intractable stricture of the urethra. In *The British Journal of Surgery* in 1915 he extended his views on this subject and described his radical operation for cure of urethral stricture by excision, which has been employed to great advantage by surgeons at least in Australia.

In 1920 Russell was instrumental in founding the Victorian Association of Surgeons. He felt that a body such as this would serve to bring together for discussion of surgical subjects the surgeons of the three clinical schools of Melbourne, which were rapidly developing along lines of their own. He looked further and saw that it might be the first step in the formation of an Australian association. As the need for such a body became more and more evident, it is little wonder that Russell was one of the three surgeons to whom the Royal Australasian College of Surgeons owes its existence. He was one of the three signatories to the original letter asking surgeons to meet and consider the formation of the College. From its inception, he was a member of the Council and its first Censor-in-Chief, which positions he held until his death. To estimate the value of his counsel in the deliberations of the College since its inception would be impossible; his spirit was the incentive to many of its activities and his influence, more profound because it was unobtrusive, was felt in every forward move that was made. At the conference preceding the establishment of this journal, he was insistent on a high literary and technical standard, and was prepared to back his opinion by practical help. None of those who were present when the portrait by George Lambert was presented to Russell by the Fellows of the College will forget the simple charm and the delight with which he received the gift.

Besides his great surgical attainments, Russell was one of the most gifted of men. No one can deny that he enjoyed high genius and employed his talents most nobly. At one time it was questionable whether he would be the more renowned for his surgical ability or for the charm of his music. A pianist of the first rank, he numbered many of the world's masters as his close friends. Amongst these men were Hambourg and Grainger, both finding great joy in Russell's never ending and abundant admiration for Bach. He had a keen appreciation for things of beauty, and it was no doubt kindred tastes which brought for him a close friendship with George Lambert. After the artist had supposedly finished his portrait of Russell (considered by many to be the greatest work of that master), a further seventy odd hours were spent in completing the work. Most of this time was spent by Russell drawing from his abundant musical score to the delight of the artist. In addition, Russell could count as his

possessions the most priceless gifts of a golden pen and a silver tongue—his writings, speeches and conversation being uniformly delightful. As one of his former house surgeons has written: "It was inevitable that in his hands the art of surgery should be raised to peerage with its science." In private life his character was unsullied even by reproach. His gentle dignity was to his fellows for ever an object of veneration, even of worship. The genuine sympathy and care which he always bestowed upon his patients were reflected in the fortitude with which he bore the burden of ill health in the latter years of his life. It was characteristic of the man that few complaints about his painful afflictions ever crossed his lips.

A life and character like that of Hamilton Russell have many claims upon the honourable remembrance of society; the more because for meritorious members of his profession there is no other public reward than the general approbation of good men. If any intense desire for being useful be worthy of honour, if its value be immeasurably increased when combined with genius of the highest order, and if the maintenance of the loftiest of ideals towards the conduct of life be deserving of admiration, then no man more worthily commanded the respect and affection of his fellows than Hamilton Russell.

Editorial Notices.

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Business communications should be addressed to MR. H. B. DEVINE, 57 Collins Street, Melbourne. Remittances should be made payable to the Royal Australasian College of Surgeons.

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